



## **DEPARTMENT OF ENERGY**

### **10 CFR Parts 429 and 430**

**[EERE-2017-BT-TP-0011]**

**RIN 1904-AD85**

### **Energy Conservation Program: Test Procedures for General Service Fluorescent Lamps, Incandescent Reflector Lamps, and General Service Incandescent Lamps**

**AGENCY:** Office of Energy Efficiency and Renewable Energy, Department of Energy.

**ACTION:** Notice of proposed rulemaking and request for comment.

**SUMMARY:** The U.S. Department of Energy (“DOE”) proposes to amend the test procedures for general service fluorescent lamps (“GSFLs”), incandescent reflector lamps (“IRLs”), and general service incandescent lamps (“GSILs”) to update to the latest versions of the referenced industry test standards and provide cites to specific sections of these standards; to clarify definitions, test conditions and methods, and measurement procedures; to clarify test frequency and inclusion of cathode power in measurements for GSFLs; to provide a test method for measuring color rendering index (“CRI”) of GSILs and IRLs and for measuring lifetime of IRLs; to allow manufacturers to make voluntary (optional) representations of GSFLs at high frequency settings; to revise the sampling requirements; and to align sampling and certification requirements with proposed test procedure terminology and with the Federal Trade Commission’s labeling program. DOE is seeking comment from interested parties on the proposal.

**DATES:** *Meeting:* DOE will hold a webinar on Thursday, June 24, 2021, from 10:00 a.m. to 2:00 p.m.

*Comments:* DOE will accept comments, data, and information regarding this proposal no later than **[INSERT DATE 60 DAYS AFTER DATE OF PUBLICATION IN THE *FEDERAL REGISTER*]**. See section V, “Public Participation,” for details.

**ADDRESSES:** See section V, “Public Participation,” for webinar registration information, participant instructions, and information about the capabilities available to webinar participants. If no participants register for the webinar then it will be cancelled.

Interested persons are encouraged to submit comments using the Federal eRulemaking Portal at <https://www.regulations.gov>. Follow the instructions for submitting comments. Alternatively, interested persons may submit comments, identified by docket number EERE–2017–BT–TP–0011, by *e-mail*: [Lamps2017TP0011@ee.doe.gov](mailto:Lamps2017TP0011@ee.doe.gov). Include the docket number EERE–2017–BT–TP–0011 or regulatory information number (“RIN”) 1904-AD85 in the subject line of the message.

*Although DOE has routinely accepted public comment submissions through a variety of mechanisms, including the Federal eRulemaking Portal, email, postal mail, or hand delivery/courier, DOE has found it necessary to make temporary modifications to the comment submission process in light of the ongoing Covid-19 pandemic. DOE is currently suspending receipt of public comments via postal mail and hand delivery/courier. If a commenter finds that this change poses an undue hardship, please contact Appliance Standards Program staff at (202) 586-1445 to discuss the need for alternative arrangements. Once the Covid-19 pandemic health*

*emergency is resolved, DOE anticipates resuming all of its regular options for public comment submission, including postal mail and hand delivery/courier.*

*Docket:* The docket, which includes *Federal Register* notices, comments, and other supporting documents/materials, is available for review at <https://www.regulations.gov>. All documents in the docket are listed in the <https://www.regulations.gov> index. However, some documents listed in the index, such as those containing information that is exempt from public disclosure, may not be publicly available.

The docket web page can be found at <https://www.regulations.gov/docket/EERE-2017-BT-TP-0011>. The docket web page contains simple instructions on how to access all documents, including public comments, in the docket. See section V for information on how to submit comments through <https://www.regulations.gov>.

#### **FOR FURTHER INFORMATION CONTACT:**

Dr. Stephanie Johnson, U.S. Department of Energy, Office of Energy Efficiency and Renewable Energy, Building Technologies Office, EE-5B, 1000 Independence Avenue, SW., Washington, DC, 20585-0121. Telephone: (202) 287-1943. E-mail: [ApplianceStandardsQuestions@ee.doe.gov](mailto:ApplianceStandardsQuestions@ee.doe.gov).

Ms. Celia Sher, U.S. Department of Energy, Office of the General Counsel, GC-33, 1000 Independence Avenue, SW., Washington, DC, 20585-0121. Telephone: (202) 287-6122. E-mail: [Celia.Sher@hq.doe.gov](mailto:Celia.Sher@hq.doe.gov).

For further information on how to submit a comment or review other public comments and the docket, contact the Appliance and Equipment Standards Program staff at (202) 287-1445 or by e-mail: *ApplianceStandardsQuestions@ee.doe.gov*.

#### **SUPPLEMENTARY INFORMATION:**

DOE proposes to maintain previously approved incorporation by references and to incorporate by reference the following industry test standards into 10 CFR part 430:

ANSI Standard C78.21-2011 (R2016), (“ANSI C78.21-2011 (R2016)”)  
“American National Standard for Electric Lamps - PAR and R Shapes,” approved August 23, 2016.

ANSI Standard C78.79-2014 (R2020), (“ANSI C78.79-2014 (R2020)”)  
“American National Standard for Electric Lamps - Nomenclature for Envelope Shapes Intended for Use with Electric Lamps,” approved January 17, 2020.

ANSI Standard C78.81, (“ANSI C78.81-2016”), “American National Standard for Electric Lamps – Double-Capped Fluorescent Lamps – Dimensional and Electrical Characteristics,” approved June 29, 2016.

ANSI Standard C78.375A-2014 (R2020), (“ANSI C78.375A-2014 (R2020)”)  
“ANSI C78.375A-2014 (R2020) Revision of ANSI C78.375-2014, American National Standard for Electric Lamps-Fluorescent Lamps-Guide for Electrical Measures,” approved January 17, 2020.

ANSI Standard C78.901, (“ANSI C78.901-2016”), “American National Standard for Electric Lamps – Single-Based Fluorescent Lamps – Dimensional and Electrical Characteristics,” approved August 23, 2016.

ANSI\_\_ANSLG\_ C81.61-2006, Revision of ANSI C81.61-2005, (“ANSI C81.61”), American National Standard for electrical lamp bases—Specifications for Bases (Caps) for Electric Lamps, approved August 25, 2006.

ANSI Standard C82.3, (“ANSI C82.3”) “American National Standard for “For Reference Lamp Ballasts for Fluorescent Lamps,” approved April 8, 2016.

IES Test Method LM-9, (“IES LM-9-20”) “ANSI/IES LM-9-2020—Approved Method: Electrical and Photometric Measurements of Fluorescent Lamps,” approved February 7, 2020.

IES Test Method LM-20, (“IES LM-20-20”) “ANSI/IES LM-20-20 Approved Method: Photometry of Reflector Type Lamps,” approved February 7, 2020.

IES Test Method LM-45, (“IES LM-45-20”) “ANSI/IES LM-45-20 Approved Method: Electrical and Photometric Measurement of General Service Incandescent Filament Lamps,” approved February 7, 2020.

IES Test Method LM-49, (“IES LM-49”) “ANSI/IES LM-49-20 Approved Method: Life Testing of Incandescent Filament Lamps,” approved February 7, 2020.

IES Test Method LM-54, (“IES LM-54”), “ANSI/IES LM-54-20 Approved Method: IES Guide to Lamp Seasoning,” approved February 7, 2020.

IES Test Method LM-58, (“IES LM-58”) “ANSI/IES LM-58-20 Approved Method: Spectroradiometric Measurements Methods for Lighting Sources,” approved February 7, 2020.

IES Test Method LM-78, (“IES LM-78”) “ANSI/IES LM-78-20 Approved Method: Total Luminous Flux Measurement of Lamps Using an Integrating Sphere Photometer,” approved February 7, 2020.

CIE 15:2018, (“CIE 15:2018”) “Colorimetry, 4<sup>th</sup> Edition,” approved 2018.

Copies of ANSI C78.21, ANSI C78.79, ANSI C78.81, ANSI C78.375A, ANSI C78.901, ANSI C81.61, and ANSI C82.3 are available at <https://www.ansi.org> or <https://www.nema.org>. Copies of IES LM-20, IES LM-45, IES LM-49, IES LM-58, IES LM-54 and IES LM-78 can be obtained by going to <https://www.ies.org/store>. Copies of CIE 15:2018 can be obtained by going to <https://cie.co.at/publications>.

For a further discussion of these standards, see section IV.M.

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**I. Authority and Background**

General service fluorescent lamps (“GSFLs”), incandescent reflector lamps (“IRLs”), and general service incandescent lamps (“GSILs”) are included in the list of “covered products” for which the U.S. Department of Energy (“DOE”) is authorized to establish and amend energy conservation standards and test procedures. (42 U.S.C. 6292(a)(14)) The current DOE test procedures for GSFLs, IRLs, and GSILs appear at title 10 of the Code of Federal Regulations (“CFR”) part 430, subpart B, appendix R (“Appendix R”). The following sections discuss DOE’s authority to establish and amend test procedures for GSFLs, IRLs, and GSILs, as well as relevant background information regarding DOE’s proposed amendments to the test procedures for these products.

**A. Authority**

The Energy Policy and Conservation Act, as amended (“EPCA”),<sup>1</sup> among other things, authorizes DOE to regulate the energy efficiency of a number of consumer products and industrial equipment. (42 U.S.C. 6291–6317) Title III, Part B<sup>2</sup> of EPCA established the Energy Conservation Program for Consumer Products Other Than Automobiles, which sets forth a variety of provisions designed to improve energy efficiency. These products include GSFLs, IRLs, and GSILs, the subject of this document. (42 U.S.C. 6292(a)(14))

The energy conservation program under EPCA consists essentially of four parts: (1) testing, (2) labeling, (3) Federal energy conservation standards, and (4) certification and enforcement procedures. Relevant provisions of EPCA specifically include definitions (42 U.S.C. 6291), energy conservation standards (42 U.S.C. 6295), test procedures (42 U.S.C. 6293), labeling provisions (42 U.S.C. 6294), and the authority to require information and reports from manufacturers (42 U.S.C. 6296).

The Federal testing requirements consist of test procedures that manufacturers of covered products must use as the basis for: (1) certifying to DOE that their products comply with the applicable energy conservation standards adopted pursuant to EPCA (42 U.S.C. 6295(s)), and (2) making representations about the efficiency of those consumer products (42 U.S.C. 6293(c)). Similarly, DOE must use these test procedures to determine whether the products comply with relevant standards promulgated under EPCA. (42 U.S.C. 6295(s))

Federal energy efficiency requirements for covered products established under EPCA generally supersede State laws and regulations concerning energy conservation testing, labeling, and standards. (See 42 U.S.C. 6297) DOE may, however, grant waivers of Federal preemption

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<sup>1</sup> All references to EPCA in this document refer to the statute as amended through the Energy Act of 2020, Public Law 116-260 (Dec. 27, 2020).

<sup>2</sup> For editorial reasons, upon codification in the U.S. Code, Part B was redesignated Part A.



in limited instances for particular State laws or regulations, in accordance with the procedures and other provisions of EPCA. (42 U.S.C. 6297(d))

Under 42 U.S.C. 6293, EPCA sets forth the criteria and procedures DOE must follow when prescribing or amending test procedures for covered products. EPCA provides in relevant part that any test procedures prescribed or amended under this section be reasonably designed to produce test results which measure energy efficiency, energy use or estimated annual operating cost of a covered product during a representative average use cycle or period of use and not be unduly burdensome to conduct. (42 U.S.C. 6293(b)(3))

Additionally, EPCA directs DOE to amend its test procedures for all covered products to integrate measures of standby mode and off mode energy consumption. (42 U.S.C. 6295(gg)(2)(A)) Standby mode and off mode energy consumption must be incorporated into the overall energy efficiency, energy consumption, or other energy descriptor for each covered product unless the current test procedures already account for and incorporate standby and off mode energy consumption or such integration is technically infeasible. If an integrated test procedure is technically infeasible, DOE must prescribe a separate standby mode and off mode energy use test procedure for the covered product, if technically feasible. (42 U.S.C. 6295(gg)(2)(A)(ii)) Any such amendment must consider the most current versions of the International Electrotechnical Commission (“IEC”) Standard 62301<sup>3</sup> and IEC Standard 62087<sup>4</sup> as applicable. (42 U.S.C. 6295(gg)(2)(A))

EPCA, as codified, directs DOE to prescribe test procedures for fluorescent lamps and incandescent reflector lamps, taking into consideration the applicable standards of the

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<sup>3</sup> IEC 62301, *Household electrical appliances—Measurement of standby power* (Edition 2.0, 2011-01).

<sup>4</sup> IEC 62087, *Methods of measurement for the power consumption of audio, video, and related equipment* (Edition 3.0, 2011-04).

Illuminating Engineering Society of North America (“IES”) or the American National Standards Institute (“ANSI”). (42 U.S.C. 6293(b)(6)) Consideration of IES and ANSI standards aligns DOE test procedures with latest industry practices for testing electric lamps and therefore DOE also considers these industry test standards when prescribing test procedures for general service incandescent lamps.

EPCA also requires that, at least once every 7 years, DOE evaluate test procedures for each type of covered product, including GSFLs, IRLs, and GSILs, to determine whether amended test procedures would more accurately or fully comply with the requirements for the test procedures to not be unduly burdensome to conduct and be reasonably designed to produce test results that reflect energy efficiency, energy use, and estimated operating costs during a representative average use cycle or period of use. (42 U.S.C. 6293(b)(1)(A)) If the Secretary determines, on his/her own behalf or in response to a petition by any interested person, that a test procedure should be prescribed or amended, the Secretary shall promptly publish in the *Federal Register* proposed test procedures and afford interested persons an opportunity to present oral and written data, views, and arguments with respect to such procedures. The comment period on a proposed rule to amend a test procedure shall be at least 60 days and may not exceed 270 days.<sup>5</sup> In prescribing or amending a test procedure, the Secretary shall take into account such information as the Secretary determines relevant to such procedure, including technological developments relating to energy use or energy efficiency of the type (or class) of covered products involved. (42 U.S.C. 6293(b)(2)) If DOE determines that test procedure revisions are

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<sup>5</sup> DOE has historically provided a 75-day comment period for test procedure NOPRs, consistent with the comment period requirement for technical regulations in the North American Free Trade Agreement, U.S.-Canada-Mexico (“NAFTA”), Dec. 17, 1992, 32 I.L.M. 289 (1993); the North American Free Trade Agreement Implementation Act, Pub. L. 103-182, 107 Stat. 2057 (1993) (codified as amended at 10 U.S.C.A. § 2576) (1993) (“NAFTA Implementation Act”); and Executive Order 12889, “Implementation of the North American Free Trade Agreement,” 58 FR 69681 (Dec. 30, 1993). However, Congress repealed the NAFTA Implementation Act and has replaced NAFTA with the Agreement between the United States of America, the United Mexican States, and the United Canadian States (“USMCA”), Nov. 30, 2018, 134 Stat. 11, thereby rendering E.O. 12889 inoperable. Consequently, since the USMCA is consistent with EPCA’s public comment period requirements and normally requires only a minimum comment period of 60 days for technical regulations, DOE now provides a 60-day public comment period for test procedure NOPRs.

not appropriate, DOE must publish its determination not to amend the test procedures. DOE is publishing this NOPR to satisfy the 7-year review requirement specified in EPCA.

## B. Background

DOE's existing test procedures for GSFLs, IRLs and GSILs appear at Appendix R ("Uniform Test Method for Measuring Average Lamp Efficacy ("LE"), Color Rendering Index ("CRI"), and Correlated Color Temperature ("CCT") of Electric Lamps").

On September 28, 1994, DOE issued an interim final rule to add a new section in the CFR to establish test procedures for certain fluorescent and incandescent lamps. 59 FR 49468. The test procedures incorporated by reference a number of IES and ANSI standards. *Id.*

On May 29, 1997, DOE published a final rule adopting, with amendments, the test procedures established in the September 1994 interim final rule. 62 FR 29222. This final rule (1) affirmed DOE's determination that the test procedures effectively measure lamp efficacy and CRI and are not unduly burdensome to conduct and (2) incorporated updates to the referenced IES and ANSI standards. *Id.*

On July 6, 2009, DOE published a final rule amending the test procedures for GSFLs, IRLs, and GSILs. 74 FR 31829. These amendments consisted largely of: (1) referencing the most current versions of several lighting industry test standards incorporated by reference; (2) adopting certain technical changes and clarifications; and (3) expanding the test procedures to accommodate new classes of lamps to which coverage was extended by the Energy Independence and Security Act of 2007 (Public Law 110-140). *Id.* The final rule also addressed the then recently established statutory requirement to expand test procedures to incorporate a

measure of standby mode and off mode energy consumption and determined that, because these modes of energy consumption were not applicable to the lamps, an expansion of the test procedures was not necessary. *Id.* Shortly thereafter, DOE again amended the test procedures to adopt reference ballast settings necessary for the additional GSFLs for which DOE was establishing standards. 74 FR 34080, 34096 (July 14, 2009).

DOE most recently amended the test procedures for GSFLs and GSILs in a final rule published on January 27, 2012. 77 FR 4203. DOE updated several references to the industry test standards referenced in DOE's test procedures and established a lamp lifetime test method for GSILs. *Id.* In that final rule, DOE determined amendments to the existing test procedure for IRLs were not necessary. *Id.*

On August 8, 2017, DOE published in the *Federal Register* a request for information seeking comments on the current test procedures for GSFLs, IRLs, and GSILs. 82 FR 37031 ("August 2017 RFI"). In the August 2017 RFI, DOE requested comments, information and data regarding several issues, including (1) updates to the incorporated standards and test methods from IES and ANSI, (2) information and data to determine if high frequency operation would affect the measured value of efficacy for specific lamp types, (3) modifying the voltage requirements for incandescent lamps, and (4) the use of the intensity distribution curve method for total lumen output for IRLs, the peak lumen method for total lumen output for GSFLs and GSILs, and use of only the integrating sphere method for all lamps. *Id.*

DOE received comments in response to the August 2017 RFI from the interested parties listed in Table I.1.

**Table I.1 August 2017 RFI Written Comments**

<b>Commenter(s)</b>	<b>Reference in this NOPR</b>	<b>Commenter Type</b>
Anonymous	Anonymous	Private Citizens
LEDVANCE	LEDVANCE	Manufacturer
California Investor-Owned Utilities	CA IOUs	Utility
National Electrical Manufacturers Association	NEMA	Industry Association
Philips Lighting	Philips	Manufacturer
Appliance Standards Awareness Project	ASAP	Efficiency Organization

This document addresses information and comments received in response to the August 2017 RFI and proposes amendments to the test procedures for GSFLs, IRLs, and GSILs. A parenthetical reference at the end of a comment quotation or paraphrase provides the location of the item in the public record.<sup>6</sup>

## **II. Synopsis of the Notice of Proposed Rulemaking**

In this NOPR, DOE proposes to update 10 CFR 430.2, 10 CFR 430.3, and Appendix R as follows: (1) update references to industry test standards to reflect current industry practices; (2) modify, add, and remove definitions to better align with the scope and test methods; (3) reference specific sections within industry test standards for further clarity; (4) provide a test method for measuring CRI for incandescent lamps to support DOE requirements; and (5) provide a test method for measuring lifetime of incandescent reflector lamps to support the Federal Trade Commission’s (“FTC’s”) labeling requirements. Additionally, DOE proposes to revise the sampling requirements and to modify language specifying sampling and certification requirements in 10 CFR 429.27 to improve readability and organization and to support the FTC’s labeling program. Further, DOE proposes to simplify language describing test procedures for

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<sup>6</sup> The parenthetical reference provides a reference for information located in the docket of DOE’s rulemaking to review test procedures for general service fluorescent lamps, incandescent reflector lamps, and general service incandescent lamps (Docket No. EERE-2017-BT-TP-0011, which is maintained at <https://www.regulations.gov>). The references are arranged as follows: (commenter name, comment docket ID number at page of that document).

GSFLs, IRLs, and GSILs in 10 CFR 430.23(r) by removing unnecessary information. Finally, DOE proposes to better align the terminology in the test procedures for GSFLs, IRLs, and GSILs with energy conservation standards codified in 10 CFR 430.32(n) and 10 CFR 430.32(x).

DOE has tentatively determined that the proposed amendments described in section III of this NOPR would not alter the measured efficiency of GSFLs, IRLs, or GSILs, or require retesting solely as a result of DOE's adoption of the proposed amendments to the test procedures, if made final. Additionally, DOE has tentatively determined that the proposed amendments, if made final, would not increase the cost of testing. DOE's proposed actions are summarized in Table II.1 and addressed in detail in section III of this NOPR.

**Table II.1 Summary of Changes in Proposed TP Relative to Current TP**

<b>Current DOE TP</b>	<b>Proposed TP</b>	<b>Attribution</b>
References lamp datasheets in the 2010 version of ANSI C78.81 and 2005 version of ANSI C78.901 to specify the appropriate reference ballast to use when testing a particular lamp.	Adopts newer versions of ANSI standards only for voluntary representations that would help DOE determine how standards can be adjusted to accommodate high frequency testing. DOE does not require certification to DOE of any voluntary representations.	Industry TP Update to ANSI C78.81 and C78.901.
References of ANSI C78.375, ANSI C82.3, IES LM-9, IES LM-58, IES LM-45, IES LM-49, IES LM-20, CIE 15	Adopts latest versions of these referenced industry standards	Industry TP Update
Does not clearly state in all instances whether testing for GSFLs should be performed at low or high frequency and whether cathode power should be included.	Clarifies in all instances whether testing should be performed at low or high frequency and whether cathode power should be included.	Information needed to conduct testing.
Does not include a method for determining CRI of incandescent lamps.	Adds test method for measuring CRI for GSILs and IRLs.	Needed to comply with the statutory minimum CRI requirement for GSILs and IRLs.
Does not include a method for determining lifetime of incandescent reflector lamps.	Adds test method for measuring lifetime of incandescent reflector lamps.	Supports FTC labeling requirements.
Definitions of IRL types do not reference the latest industry standards.	Update definitions for BPAR, R20, ER, and BR incandescent reflector lamps and define PAR and R incandescent lamps with references to latest versions of ANSI C78.21-2011 (R2016) and ANSI C78.79-2014 (R2020), as appropriate.	Update definitions to reference latest industry standards
Specifies only CRI to be measured from the same sample of units.	Specifies all metrics for all lamps be measured from the same sample of units.	Ensures different units are not selected for each metric.
Requires testing a minimum of 21 lamps by selecting a minimum of three lamps from each month of production	Decreases the minimum number of lamps tested to be 10 instead of 21 and removes the requirement for lamps to be selected from at	Aligns sampling requirements with those of other lighting

<b>Current DOE TP</b>	<b>Proposed TP</b>	<b>Attribution</b>
for a minimum of 7 out of a 12-month period.	least 7 different months of a 12-month period.	products ( <i>i.e.</i> , integrated light-emitting diode [LED] lamps and compact fluorescent lamps [CFLs]).

### **III. Discussion**

Although the August 2017 RFI requested comments, information and data regarding several specific issues, DOE welcomed written comments from the public on any subject within the scope of the document (including topics not raised in the RFI). In response to the August 2017 RFI, DOE received several general comments. One stakeholder stated that DOE should rescind many energy conservation standards as new reports indicate such regulations are redundant and increase costs, are hurtful to seniors and low-income groups, and do not protect the environment. (Anonymous, No. 4 at p. 1) Other stakeholders stated that regulations should be waived for the states of Texas and Louisiana, due to the destruction caused in these states by Hurricane Harvey. (Anonymous, No. 3 at p. 1; Anonymous, No. 2 at p. 1)

As stated in section I.A, DOE is publishing this NOPR to satisfy the 7-year review requirement specified in EPCA. This notice proposes updates to DOE test procedures to reflect current industry practices that are reasonably designed to produce test results which measure energy efficiency and energy use during a representative average use cycle or period of use, as determined by the Secretary, and are not unduly burdensome to conduct. The estimated costs of the proposed updates are discussed in section III.H of this document. The scope of this notice does not include granting waivers to test procedures. (See 10 CFR 430.27 for procedures to petition for waivers from test procedures.)

Philips provided another general comment that as a NEMA member, it supported any comments submitted by NEMA in response to the August 2017 RFI. (Philips, No. 8 at p. 2) CA IOUs, along with ASAP, commended DOE for reassessing the test procedures for GSFLs, IRLs, and GSILs. CA IOUs noted that, while updates to the test procedures would impact state and voluntary regulations, it would be to a lesser extent due to the proliferation of solid-state lighting (“SSL”) products. (CA IOUs, No. 6 at p. 1; ASAP, No. 9 at pp. 1-2) ASAP stated that, if updated test procedures resulted in a change in measured energy use that was not de minimis, DOE must modify the associated energy conservation standard. (ASAP, No. 9 at pp. 1-2)

DOE evaluates and discusses the impact of proposed amendments on measured values throughout this notice.

#### A. Scope of Applicability

DOE test procedures for GSFLs, IRLs, and GSILs are codified in Appendix R and associated sampling and certification requirements are codified in 10 CFR 429.27. The scope of this rulemaking is to review and amend, as applicable, the test procedures for GSFLs, IRLs, and GSILs and the associated sampling and certification requirements. DOE received comments regarding scope in response to the August 2017 RFI.

In two final rules, effective January 1, 2020, DOE revised the definitions of general service lamp (“GSL”) and GSIL by bringing certain categories of lamps that had been excluded by statute from the definition of GSIL within the definitions of GSIL and GSL. 82 FR 7276; 82 FR 7322 (January 19, 2017) (“2017 GSL Definition Rules”). CA IOUs stated that DOE should acknowledge that its updated test methods will apply to the new GSIL definition, as defined by DOE on January 19, 2017. (CA IOUs, No. 6 at p. 1) As noted, the requirements specified in



Appendix R and 10 CFR 429.27 apply to GSILs and IRLs as those terms are defined in 10 CFR 430.2.

NEMA commented that DOE should not require lifetime testing of plug-in CFLs on reference ballasts. (NEMA, No. 7 at p. 6) The scope of this notice does not include assessing test procedures for CFLs.

#### B. Incorporation by Reference of Industry Test Standards

The test conditions, methods, and measurements described in Appendix R reference several ANSI and IES standards. Several of the referenced industry test standards have been updated by industry since DOE last amended its test procedures. In the August 2017 RFI DOE requested information on updating Appendix R to reference the updated versions of these standards. 82 FR 37031, 37033, 37034.

NEMA stated it appreciated DOE's efforts to update current test procedures to reflect progress in related industry test standards and test procedures. NEMA anticipated no issues in updating to the current versions of standards (*i.e.*, industry test methods) unless it required retesting all currently certified products and noted this may be the case for certain standards related to GSFLs (see section 1 for more information). (NEMA, No. 7 at p. 1) CA IOUs also supported updating referenced industry test standards so that they are more relevant and consistent with products serving the same consumer utility. (CA IOUs, No. 6 at p. 1) ASAP added that industry test standards should be reviewed to ensure test results are reliable and accurate. (ASAP, No. 9 at pp. 1-2)

In this NOPR, DOE reviews the latest versions of industry test standards to identify differences compared to previous versions and assesses the impact of changes on measured values.

NEMA and LEDVANCE stated that, even following ANSI and IES standards, testing variations will occur and, therefore, the lighting industry requires acceptable measurement and laboratory tolerances when considering compliance with standards. Further, they added that DOE should reference the NEMA LSD-63<sup>7</sup> standard which provides industry-standardized testing tolerances for lamps. (NEMA, No. 7 at pp. 5-6; LEDVANCE, No. 5 at p. 6) NEMA LSD-63 factors in long-term manufacturing data variability and inter-lab measurement bias to assess the validity of a sample of values in comparison to the rated value based on a population of lamps. DOE notes that these considerations can be useful when developing the appropriate minimum requirements in a standards rulemaking. DOE finds that its test methods provide repeatable and reproducible results for a single lamp and its sampling requirements in 10 CFR 429.27 account for variation in the sample by comparing the mean value against a confidence limit. Hence, DOE has tentatively concluded that its test procedures sufficiently address variation in lamp manufacturing and testing without the need to reference NEMA LSD-63. DOE notes that, if supported by test data, manufacturers can rate their product lower than the maximum allowed value or higher than minimum allowed value per 10 CFR 429.27.

Table III.1 shows the industry test standards currently referenced in Appendix R, whether there is an updated version available, and whether DOE is proposing to update to the latest version. In addition, DOE is proposing to incorporate by reference IES LM-54-2020<sup>8</sup> and IES

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<sup>7</sup> National Electrical Manufacturers Association, *A NEMA Lighting Systems Division Document LSD-63-2012-Measurement Methods and Performance Variation for Verification Testing of General Purpose Lamps and Systems*. Approved July 20, 2012.

<sup>8</sup> Illuminating Engineering Society, *ANSI/IES LM-54-20 Approved Method: IES Guide to Lamp Seasoning*, Approved February 7, 2020.

LM-78-2020<sup>9</sup> for Appendix R. The proposed updates to industry test standard references do not involve substantive changes to the test setup and methodology, but rather clarifications. DOE has tentatively determined that incorporation by reference of the latest versions will better align DOE test procedures with industry practice and further increase the clarity of the test methods. DOE requests comment on incorporating by reference the updated versions of standards proposed in Table III.1 for Appendix R. DOE requests comments on incorporating by reference IES LM-54-2020 and IES LM-78-2020 for Appendix R. Each proposed industry test standard and associated comments and responses are discussed in the following sections.

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<sup>9</sup> Illuminating Engineering Society, *ANSI/IES LM-78-20 Approved Method: Total Luminous Flux Measurement of Lamps Using an Integrating Sphere Photometer*. Approved February 7, 2020.

**Table III.1 Industry Test Standards Referenced in Appendix R to 10 CFR 430 subpart B**

<b>Industry Test Standard Referenced in Appendix R</b>	<b>Updated Version if Available</b>	<b>Proposed for Update</b>
ANSI C78.375 version 1997 <sup>10</sup> (section 4.1.1 of Appendix R)	ANSI C78.375A version 2020 <sup>11</sup>	Proposed
ANSI C78.81 version 2010 <sup>12</sup> (section 4.1.1 of Appendix R)	ANSI C78.81 version 2016 <sup>13</sup>	Proposed for voluntary representations
ANSI C78.901 version 2005 <sup>14</sup> (section 4.1.1 of Appendix R)	ANSI C78.901 version 2016 <sup>15</sup>	Proposed for voluntary representations
ANSI C82.3 version 2002 <sup>16</sup> (section 4.1.1 of Appendix R)	ANSI C82.3 version 2016 <sup>17</sup>	Proposed
IES LM-9 version 2009 <sup>18</sup> (sections 2.1, 2.9, 3.1, 4.1.1, 4.4.1 of Appendix R)	IES LM-9 version 2020 <sup>19</sup>	Proposed
IESNA LM-58 version 1994 <sup>20</sup> (sections 2.1, 4.4.1 of Appendix R)	IES LM-58 (retitled) version 2020 <sup>21</sup>	Proposed
IES LM-45 version 2009 <sup>22</sup> (sections 2.1, 2.9, 3.2, 4.2.1, 4.2.2 of Appendix R)	IES LM-45 version 2020 <sup>23</sup>	Proposed

<sup>10</sup> American National Standards Institute, *ANSI C78.375-1997, Revision of ANSI C78.375-1991, American National Standard for electric lamps: Fluorescent Lamps Guide for Electrical Measurements*. Approved September 25, 1997.

<sup>11</sup> American National Standards Institute, *ANSI C78.375A-2014 (R2020) Revision of ANSI C78.375-2014, American National Standard for Electric Lamps-Fluorescent Lamps-Guide for Electrical Measures*. Approved January 17, 2020.

<sup>12</sup> American National Standards Institute, *ANSI/ANSI C78.81-2010 Revision of ANSI C78.81-2005. American National Standard for Electric Lamps—Double-Capped Fluorescent Lamps— Dimensional and Electrical Characteristics*. Approved January 14, 2010.

<sup>13</sup> American National Standards Institute, *ANSI C78.81-2016 American National Standard For Electric Lamps—Double-Capped Fluorescent Lamps— Dimensional and Electrical Characteristics*. Approved June 29, 2016.

<sup>14</sup> American National Standards Institute, *ANSI/IEC C78.901-2005 Revision of ANSI C78.901-2001, American National Standards for Electric Lamps – Single-Based Fluorescent Lamps – Dimensional and Electrical Characteristics*. Approved March 23, 2005.

<sup>15</sup> American National Standards Institute, *ANSI/NEMA C78.901-2016 American National Standards for Electric Lamps – Single-Based Fluorescent Lamps – Dimensional and Electrical Characteristics*. Approved August 23, 2016.

<sup>16</sup> American National Standards Institute, *ANSI C82.3-2002 American National Standard For Lamp Ballasts—Reference Ballasts for Fluorescent Lamps*. Approved January 1, 2002.

<sup>17</sup> American National Standards Institute, *ANSI C82.3-2016 American National Standard For Reference Lamp Ballasts for Fluorescent Lamps*. Approved April 8, 2016.

<sup>18</sup> Illuminating Engineering Society of North America, *IES LM-9-09 IES Approved Method for the Electrical and Photometric Measurements of Fluorescent Lamps*. Approved January 31, 2009.

<sup>19</sup> Illuminating Engineering Society, *ANSI/IES LM-9-2020—Approved Method: Electrical and Photometric Measurements of Fluorescent Lamps*. Approved February 7, 2020.

<sup>20</sup> Illuminating Engineering Society of North America, *LM-58 IESNA Guide to Spectroradiometric Measurements*. Approved December 3, 1994.

<sup>21</sup> Illuminating Engineering Society, *ANSI/IES LM-58-20 Approved Method: Spectroradiometric Measurements Methods for Lighting Sources*. Approved February 7, 2020.

<sup>22</sup> Illuminating Engineering Society, *IES LM-45-09 IES Approved Method for The Electrical and Photometric Measurement of General Service Incandescent Filament Lamps*. Approved December 14, 2009.

<sup>23</sup> Illuminating Engineering Society, *ANSI/IES LM-45-20 Approved Method: Electrical and Photometric Measurement of General Service Incandescent Filament Lamps*. Approved February 7, 2020.

IESNA LM-49 version 2001 <sup>24</sup> (section 4.2.3 of Appendix R)	IES LM-49 (retitled) version 2020 <sup>25</sup>	Proposed
IESNA LM-20 version 1994 <sup>26</sup> (sections 2.1, 2.9, 3.3, 4.3 of Appendix R)	IES LM-20 (retitled) version 2020 <sup>27</sup>	Proposed
CIE 13.3 version 1995 <sup>28</sup> (section 2.1, 4.4.1 of Appendix R)	No updated version available	N/A
CIE 15 version 2004 <sup>29</sup> (section 4.4.1 of Appendix R)	CIE 15 version 2018 <sup>30</sup>	Proposed

# 1. ANSI C78.375, ANSI C78.81, ANSI C78.901, and ANSI C82.3

Section 4.1.1 of Appendix R references industry test standards ANSI C78.375, ANSI C78.81, and ANSI C78.901 for the appropriate voltage and current conditions and ANSI C82.3 for the appropriate reference circuits in taking measurements of GSFLs.

ANSI C78.375 provides general guidance for taking measurements of electrical characteristics of fluorescent lamps. DOE reviewed changes in ANSI C78.375A-2020 relevant to specifications of voltage and current conditions. DOE identified that updates in ANSI C78.375A-2020 compared to its 1997 version included new references to industry test standards ANSI C78.81, ANSI C78.901, and ANSI C82.3 to determine the appropriate voltage and current to use in reference circuits. 82 FR 37031, 37034. Regarding updating DOE's test procedure to reference ANSI C78.375A-2014, NEMA and LEDVANCE stated they were not aware of any issues. (NEMA, No. 7 at pp. 2-3; LEDVANCE, No. 5 at p. 3) Because ANSI C78.81, ANSI

<sup>24</sup> Illuminating Engineering Society, *IES LM-49-12 Approved Method: Life Testing of Incandescent Filament Lamps*. Approved December 1, 2001.

<sup>25</sup> Illuminating Engineering Society, *ANSI/IES LM-49-20 Approved Method: Life Testing of Incandescent Filament Lamps*. Approved February 7, 2020.

<sup>26</sup> Illuminating Engineering Society of North America, *LM-20 IESNA Approved Method for Photometric Testing of Reflector-Type Lamps*. Approved December, 3, 1994.

<sup>27</sup> Illuminating Engineering Society, *ANSI/IES LM-20-20 Approved Method: Photometry of Reflector Type Lamps*. Approved February 7, 2020.

<sup>28</sup> International Commission on Illumination, *Method of Measuring and Specifying Colour Rendering Properties of Light Sources*. Approved 1995.

<sup>29</sup> International Commission on Illumination, *Colorimetry, 3<sup>rd</sup> Edition*. Approved 2004.

<sup>30</sup> International Commission on Illumination, *Colorimetry, 4<sup>th</sup> Edition*. Approved 2018.

C78.901, and ANSI C82.3 are already referenced by the DOE test procedure to determine the voltage and current to use in reference circuits, and DOE has determined (as described in the following paragraphs) that changes in the updated versions of these industry test standards will not affect final measured values, DOE has tentatively determined this update in ANSI C78.375A-2020 would not impact the current requirements of the DOE test procedure or change final measured values. Therefore, DOE proposes to update references from the 1997 version of ANSI C78.375 to the 2020 version in Appendix R.

Per section 4.1.1 of Appendix R, GSFLs must be operated by a reference ballast at an input voltage specified in the reference circuit as described in ANSI C82.3. ANSI C82.3 provides general design and operating characteristics for reference ballasts used to test fluorescent lamps. Compared to the 2002 version, the 2016 version of ANSI C82.3 contains updates regarding impedance tolerances, voltage regulation, and instrumentation for taking high frequency measurements. 82 FR 37031, 37034. Regarding updating DOE's test procedure to reference ANSI C82.3-2016, NEMA and LEDVANCE stated they were not aware of any issues. (NEMA, No. 7 at pp. 2-3; LEDVANCE, No. 5 at p. 3)

DOE identified the specific changes in the updated version of ANSI C82.3 to the impedance, frequency, and voltage requirements when operating a reference ballast with a fluorescent lamp in high frequency conditions. First, the 2016 version of ANSI C82.3 no longer requires an impedance tolerance of 1 percent for currents between 50 and 115 percent of the calibration current. Second, the 2016 version of ANSI C82.3 removes frequency tolerances for operation with certain types of reference ballasts. Third, the 2016 version of ANSI C82.3 increases the power supply voltage tolerance from 0.2 percent to 1.0 percent. Although the 2016 version of ANSI C82.3 removes impedance tolerances at certain currents and the frequency tolerance and allows a wider range for power supply voltage tolerance, DOE's current test procedure requires reference ballasts to meet specific current, frequency, and voltage

requirements and associated tolerances specified in the relevant lamp datasheets. Hence, if all requirements for reference ballasts in DOE's test procedures are satisfied, DOE has tentatively determined that changes in impedance, frequency, and voltage tolerances in ANSI C82.3 would not affect final measured values. DOE has tentatively determined updates in ANSI C82.3-2016 would not impact the current requirements of the DOE test procedure or change final measured values. Therefore, DOE proposes to update references from the 2002 version of ANSI C82.3 to the 2016 version in Appendix R.

Lamp data sheets with physical and electrical characteristics of fluorescent lamps are provided in ANSI C78.81 (double-ended lamps) and ANSI C78.901 (single-ended lamps). In the latest versions, ANSI C78.81-2016 and ANSI C78.901-2016, DOE has identified new lamp datasheets and updates to existing lamp datasheets for certain GSFLs. DOE proposes to maintain the current references to ANSI C78.81-2010 and ANSI C78.901-2005 for determining compliance and to add provisions for manufacturers to make additional voluntary representations based on high frequency testing using the updated lamp data sheets. A lamp data sheet provides the physical and electrical characteristics needed to operate a lamp appropriately, including starting method and the input voltage, current, and impedance of the reference ballast on which the lamp should be tested. For some lamps, the updated industry test standard now specifies only high frequency reference ballast settings, whereas previously low frequency settings were provided. Because cathode heat is not utilized at high frequency, the lamp efficacy would likely increase during high frequency operation compared to low frequency operation. DOE's test procedure requires testing at low frequency unless only high frequency settings are provided. Hence the potential adoption of ANSI C78.81-2016 and ANSI C78.901-2016 could result in certain lamps that were previously tested at low frequency being tested at high frequency, negating the consideration of cathode heat. ANSI C78.81-2016 and/or ANSI C78.901-2016 remove low frequency reference ballast settings and provide only high frequency reference

ballast settings for the following lamps: 32 Watt (“W”), 48-Inch T8 lamp; 32 W U-shaped lamp, 6-Inch Center T8 lamp; 31 W, U-shaped, 1-5/8 Inch Center T8 lamp; 59 W, 96-Inch T8, Single Pin Instant Start lamp; and 25 W, 28 W, and 30 W 48-Inch T8 lamps. Additionally, two new lamp datasheets were added providing only high frequency reference ballast settings for the following lamps: 30 W, U-shaped, 6-Inch Center T8 lamp and 54 W 96-Inch T8, Single Pin Instant Start lamp. 82 FR 37031, 37034.

NEMA noted that, although DOE stated in the August 2017 RFI that the updated version of ANSI C78.901 was 2014, a 2016 version was available. (In this notice, DOE’s assessments of ANSI C78.901 are based on the 2016 version.) However, in general, NEMA, LEDVANCE, and Philips objected to adopting any updated versions of ANSI C78.901 or ANSI C78.81. NEMA, LEDVANCE, and Philips explained that testing fluorescent lamps at high frequency settings instead of low frequency settings would result in an apparent measured efficiency increase of approximately 5 to 10 percent. (NEMA, No. 7 at p. 3; LEDVANCE, No. 5 at p. 3; Philips, No. 8 at p. 2)

NEMA stated that current standards for GSFLs were based on the 2010 version of ANSI C78.81 and 2005 version of ANSI C78.901 currently referenced in Appendix R. NEMA and Philips asserted that testing lamps previously tested under low frequency settings at high frequency settings could allow non-compliant lamps to meet standards. (NEMA, No. 7 at p. 3; Philips, No. 8 at p. 2) NEMA stated that compliance with standards must remain linked to the test procedures on which the standards are based. (NEMA, No. 7 at p. 3) LEDVANCE asserted that, if DOE were to update to the latest versions of ANSI C78.81 and ANSI C78.901, it would also have to amend the applicable energy conservation standards for GSFLs and increasing these standards was unreasonable for a mature product already at maximum technology.



Additionally, LEDVANCE stated, because at high frequency settings the lamp is providing the same lumen output as at low frequency but at a lower system wattage, the efficacy increase would be misleading to the consumers, who associate higher efficacy with more lumens, ultimately causing consumer dissatisfaction. (LEDVANCE, No. 5 at p. 3)

NEMA and LEDVANCE added that changing the test procedure to reference high rather than low frequency settings would require retesting lamps, resulting in significant test burden for all manufacturers. LEDVANCE estimated that retesting a portfolio of T8 lamps could cost between \$100,000 to \$200,000, excluding test equipment purchases and certification costs. (NEMA, No. 7 at p. 3; LEDVANCE, No. 5 at p. 3)

DOE's assessment of ANSI C78.81-2016 and ANSI C78.901-2016 indicates that there has been a considerable shift to testing on high frequency settings for fluorescent lamps. Except for T12 lamps and a 51 W 8-foot single-pin T8 lamp, GSFLs with ANSI specifications have only high frequency reference ballast settings in the updated standards. This shift was also noted in the review of GSFL energy conservation standards updated in a final rule published January 26, 2015, and for which compliance was required beginning January 26, 2018. 80 FR 4042 ("2015 GSFL Rule").

In response to the preliminary analysis preceding the 2015 GSFL Rule, NEMA stated that, because of the market shift to electronic high frequency ballasts, ANSI had drafted new standards for electrical and photometric characterization of GSFL T8 lamps that were based on high frequency rather than the former low frequency 60 Hz reference ballasts. NEMA further explained that these high frequency specifications would be published in 2013 at which point industry would begin characterizing its products using these high frequency specifications. NEMA recommended that DOE base its assessment of potential amendments to standards for

GSFLs on the new ANSI high frequency standards. 79 FR 24068, 24096 (April 29, 2014). In response to the NOPR of the 2015 GSFL Rule, NEMA also raised several concerns with DOE's Compliance, Certification Management System ("CCMS") database and the use of high frequency settings. NEMA stated that DOE's assessment of the CCMS data indicated the possibility that 4-foot medium bipin ("MBP") reduced wattage lamps and 59 W and 54 W 8-foot single-pin slimline lamps (59 W to a lesser degree) are being tested erroneously on high frequency settings. 80 FR 4071, 4072.

The updated ANSI standards were not available in time for the 2015 GSFL Rule to consider basing its analysis on high frequency specifications. Hence the 2015 GSFL Rule established efficacy levels based on ANSI wattages as specified in ANSI C78.81-2010 and ANSI C78.901-2004 and initial lumen outputs published in manufacturer catalogs.<sup>31</sup>

It would be to the benefit of the manufacturers and consumers to align DOE requirements to the latest industry requirements, providing one consistent method of assessing the efficacy of fluorescent lamps. DOE understands that the change in measured efficacy when testing on high frequency versus low frequency settings resulting from updated versions of ANSI C78.81 and ANSI C78.901 is not de minimis. Adoption of test procedures that reference the latest versions of ANSI C78.81 and ANSI C78.901 would impact compliance under the current GSFL energy conservation standards and require reassessment of the energy conservation standards based on measured values tested according to DOE test procedures using the updated industry test standards (*e.g.*, ANSI C78.81-2016 and ANSI C78.901-2016).

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<sup>31</sup> At the time of the analysis, the dataset on DOE's certification database did not represent a comprehensive dataset on which to base an engineering analysis. DOE utilized catalog data to identify baseline products and develop initial efficacy levels. DOE then used available certification data to adjust the initial efficacy levels, if necessary, to ensure that the considered levels could be met based on the certification values submitted by manufacturers to demonstrate compliance with standards. 79 FR 24068, 24094.

Based on the impact to test results from testing using only high frequency settings as provided in ANSI C78.81-2016 and ANSI C78.901-2016, and the corresponding potential that products currently not compliant would meet the energy conservation standards if tested under these latest industry test standards, DOE proposes to maintain the references to the 2010 version of ANSI C78.81 and 2005 version of ANSI C78.901. This ensures that lamps are tested and certified for compliance according to settings upon which current minimum requirements for GSFLs were established. However, DOE also proposes that manufacturers can voluntarily make representations at the high frequency settings specified in the 2016 versions of ANSI C78.81 and ANSI C78.901 in accordance with test procedures specified in Appendix R and sampling requirements in 10 CFR 429.27. These values would not be used for compliance but would be in addition to values obtained for compliance and used for determining if and how standards for GSFLs should be amended to accommodate testing at high frequency settings. As a best practice, an indication of high frequency operation should be provided with the voluntary representations. DOE proposes to incorporate by reference ANSI C78.81-2016 and ANSI C78.901-2016 for this purpose.

Also, ANSI C78.81-2016 includes updates to the reference ballast characteristics for input voltage and impedance while maintaining the current for the 86 W, 96-Inch T8 lamp. In the August 2017 RFI, DOE requested information on how these updated ballast characteristics would impact measured lamp efficacy. 82 FR 37031, 37034. LEDVANCE responded that for the 86 W, 96-Inch T8 lamp the impedance was changed simply to harmonize the impedance value across lamp types and to aid with starting. LEDVANCE further stated that changing the impedance or circuit voltage to maintain the same lamp current would not change any lamp characteristics. (LEDVANCE, No. 5 at p. 4)

DOE has preliminarily determined that changes to lamp characteristics of the 86 W, 96-Inch T8 lamp will not impact final measured values. However, as stated previously, due to updates that provide only high frequency settings for certain lamps, DOE is not proposing to incorporate ANSI C78.81-2016 for the purposes of testing to assess compliance with DOE's minimum requirements.

## 2. IES LM-58

Section 4.4.1 of Appendix R describes test methods for measuring CRI and CCT. It states that the required spectroradiometric measurement and characterization shall be conducted in accordance with IES LM-58.<sup>32</sup> DOE's review indicated that key changes in IES LM-58-2013 compared to its 1994 version include: 1) updates to definitions; 2) clarification updates regarding the characteristics of spectroradiometers and applicable detectors; and 3) additions of a new method called array spectrometry and a section on correction methods. In the August 2017 RFI DOE requested information on referencing the updated version of IES LM-58 and on the impact on measured values of using the new array spectrometry method. 82 FR 37031, 37034. NEMA and LEDVANCE stated that adoption of IES LM-58-2013 posed no known issues. They added that the IES ensures equivalent test results when adding new test procedures and, therefore, supported the array spectrometry method as an option. Additionally, NEMA and LEDVANCE pointed out that an addendum to IES LM-58-2013 had been published to make certain corrections to the initial version. (NEMA, No. 7 at p. 2; LEDVANCE, No. 5 at p. 4)

Since the publication of the August 2017 RFI, a 2020 version of IES LM-58 has been published. In this notice, DOE is proposing to update the currently referenced 1994 version of IES LM-58 to the 2020 version. Specifically, the 2020 and 2013 versions of IES LM-58 remove

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<sup>32</sup> Note that the 1994 version of this standard was titled IESNA LM-58 but the 2013 version is titled IES LM-58.

definitions for spectral irradiance, spectral radiance, and spectral radiant intensity; and add a definition for colorimeter. IES LM-58-2020 also removes the definition for bandwidth and replaces the term bandwidth with bandpass throughout the standard. IES LM-58-2020 continues to describe how to measure spectral irradiance, spectral radiance, and spectral radiant intensity, which are different ways of measuring radiant flux, and describe how to use bandpass (previously referred to as bandwidth) in detail. DOE has tentatively determined the term colorimeter, which is a basic instrument for measuring chromaticity, was likely added for completeness. IES LM-58-2020 also includes the new section on array spectrometry and adds further specificity in taking spectral power measurements. It specifies that the stray light for a good single-pass and double-pass monochromator to be respectively, less than  $10^{-4}$  and  $10^{-8}$  times than the maximum signal while the 1994 version specifies  $10^{-3}$  and  $10^{-6}$ . It also states that when the slit scattering function is not triangular, the scanning interval should be reduced to an integer fraction of the bandpass to reduce errors. DOE also evaluated the addendum to IES LM-58-2013 and found that it reverted bandwidth tolerance to that specified in the 1994 version of IES LM-58 and provided further guidance on determining bandwidth. The content of the addendum has been incorporated into IES LM-58-2020. DOE has tentatively determined that these additions are only clarifications and are already being adhered to by industry in practice. Similarly, the addition of a section on correction methods is only explicitly stating best practices likely already being followed by test laboratories when taking spectral power measurements. DOE has tentatively determined updates in IES LM-58-2020 would not change current requirements of the DOE test procedure or change final measured values. Thus, DOE proposes to update references from the 1994 version of IES LM-58 to the 2020 version in 10 CFR 430.3 for Appendix R.

### 3. IES LM-45

Sections 3.2, 4.2.1, and 4.2.2 of Appendix R specify that for GSILs test conditions, methods, and measurements should be conducted in accordance with 2009 version of IES LM-45. IES LM-45 provides methods for taking electrical and photometric measurements of general service incandescent filament lamps. DOE's initial review indicated that changes in IES LM-45-2015, compared to its 2009 version, included clarification updates regarding the impact of lamp polarity on light output and changes to certain tolerances (*e.g.*, impedance limits for instruments). 82 FR 37031, 37034. Regarding referencing the updated version of IES LM-45, NEMA and LEDVANCE stated that adoption of IES LM-45-2015 posed no known issues. (NEMA, No. 7 at pp. 2,4; LEDVANCE, No. 2 at p. 4)

Since the publication of the August 2017 RFI, a 2020 version of IES LM-45 has been published. In this notice, DOE is proposing to update the currently referenced 2009 version of IES LM-45 to the 2020 version. Specifically, DOE identified the following key changes in both the 2015 and 2020 versions of IES LM-45, compared to the currently referenced 2009 version: 1) specifies testing with the same polarity connections; 2) increases impedance tolerance of current input from 10 milliohms to 20 milliohms; and 3) updates tolerances for detector used to measure lumens.

DOE has tentatively determined that added information on polarity connections in IES LM-45-2020 is only explicitly stating what is likely already practiced by test laboratories based on how measurements are taken in electrical circuit setups. DOE has tentatively concluded that the change in current input impedance tolerance for instrumentation is small and not discernable in the final measured values. Regarding updates to detector use, the 2020 version states each detector must have a relative spectral responsivity which approximates the luminosity function less than 3 percent while a 5 percent threshold is specified in the 2009 version. Additionally, the 2020 version states that the minimum distance of the detector is 10 times the lamp length to

keep error less than 1 percent while 5 times the lamp length is specified in the 2009 version. DOE has tentatively concluded that these changes have been made to ensure accuracy of measurement but do not substantively impact final measured values.

IES LM-45 references IES LM-54, the industry standard for lamp seasoning, with regards to seasoning lamps. Section 6.2 of IES LM-45-2020 updates its references of IES LM-54 from the 1999<sup>33</sup> version to the 2020 version. DOE has tentatively determined that referencing the 2020 version of IES LM-54 will not change final measured values and proposes to incorporate the standard for appendix R (see section 7). Because lamp seasoning is a necessary part of testing GSILs, DOE is proposing to incorporate by reference IES LM-54-2020 for appendix R and referencing section 6.2 of IES LM-45-2020 directly in its revisions to Appendix R (see section III.C.a). IES LM-45 also references IES LM-78, the industry standard for measurements in an integrating sphere, with regards to measurements using a photodetector and for detector sources of error. Section 7.0 of IES LM-45-2020 updates its references of IES LM-78, from the 2007 version<sup>34</sup> to the 2020 version. DOE has tentatively determined that referencing the 2020 version IES LM-78 will not change final measured values and proposes to incorporate the standard for appendix R (see section 8). Because DOE allows use of an integrating sphere to make necessary photometric measurements of GSILs, DOE is proposing to incorporate by reference IES LM-78-2020 for appendix R and referencing section 7.0 of IES LM-45-2020 directly in its revisions to Appendix R (see section III.C.b).

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<sup>33</sup> Illuminating Engineering Society of North America, *LM-54-99 IESNA Guide to Lamp Seasoning*, Approved May 10, 1999.

<sup>34</sup> Illuminating Engineering Society of America, *IESNA LM-78-07 IESNA Approved Method for Total Luminous Flux Measurement of Lamps Using an Integrating Sphere Photometer*. Approved January 28, 2007.

In summary, DOE has tentatively concluded that updates in IES LM-45-2020 would not change final measured values. Therefore, DOE proposes to update references from the 2009 version of IES LM-45 to the 2020 version in Appendix R.

#### 4. IES LM-49

Section 4.2.3 of Appendix R specifies that lifetime testing of GSILs must be conducted in accordance with the 2001 version of IESNA LM-49. IESNA LM-49<sup>35</sup> provides test methods for measuring the lifetime of incandescent filament lamps. DOE's initial review indicated that key changes in IES LM-49-2012 compared to its 2001 version included: (1) clarifications regarding input voltage, voltage regulation, lamp handling, wiring, and recording failures; (2) addition of instrument voltage tolerances; and (3) direction regarding the interval at which operation of lamps must be checked. 82 FR 37031, 37034. Regarding updating references to IES LM 49-2012, NEMA and LEDVANCE stated that adoption of IES LM-49-2012 posed no known issues. (NEMA, No. 7 at pp. 2,4; LEDVANCE, No. 2 at p. 5)

Since the publication of the August 2017 RFI, a 2020 version of IES LM-49 has been published. In this notice, DOE is proposing to update the currently referenced 2001 version of IES LM-45 to the 2020 version. The key changes DOE identified were in both the 2012 and 2020 versions of IES LM-49. Specifically, DOE identified revisions in IES LM-49-2020 that modify language to appropriately use root mean square ("RMS") voltage and provide further specifications on test receptacles and lamp holders. The added instrument tolerances for the test voltage are the same as those specified in IES LM-45-2009. Because IES LM-45-2009 is the currently referenced standard for electrical and photometric measurements of incandescent lamps, the tolerances in this standard are likely already being followed for any test of an

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<sup>35</sup> Note that the 2001 version of this standard was titled IESNA LM-49 but the 2012 version is titled IES LM-49.



incandescent lamp. IES LM-49-2020 changes the interval for checking lamp failures from no more than 0.5 percent of rated life to 1 percent of rated life. This change continues to allow checking lamp failure at or less than 0.5 percent of rated life, and therefore would not require retesting. Further DOE finds that IES LM-49-2020 also specifies the recorded failure time should be the midpoint of the monitoring interval. This specification would add consistency to the execution of the test method. Further, because each interval is no more than a few minutes, the point within the interval at which the measurement is taken would not have a significant impact on the final measured value.

DOE has tentatively concluded that the updates in IES LM-49-2020 would not change final measured values. Therefore, DOE proposes to update references from the 2001 version of IES LM-49 to the 2020 version in Appendix R.

## 5. IES LM-20

Sections 3.3, 4.3.1, and 4.3.2 of Appendix R specify that, for IRLs, test conditions, methods, and measurements must be conducted in accordance with IESNA LM-20-1994. IESNA LM-20<sup>36</sup> provides methods for taking photometric measurements of reflector-type lamps. DOE's initial review indicated that IES LM-20-2013, compared to its 1994 version, included the addition of new definitions and changes to existing definitions. IES LM-20-2013 also included updates regarding characteristics of photometers, lamp stabilization, intensity distribution determination, among other topics; and changes to certain tolerances (e.g., allowable reflectivity in the integrated sphere). 82 FR 37031, 37035. Specifically, DOE identified the following key changes in IES LM-20-2013, compared to its 1994 version: (1) updates to definitions; (2) updates regarding the integrating sphere method; (3) updates to referenced industry test standards

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<sup>36</sup> Note that the 1994 version of this standard was titled IESNA LM-20 but in the 2013 version titled IES LM-20.

regarding test conditions; and (4) inclusion of reference to stabilization procedures. Regarding updating references to IES LM-20-2013, NEMA and LEDVANCE stated that adoption of IES LM-20-2013 posed no known issues. (NEMA, No. 7 at pp. 2,4; LEDVANCE, No. 2 at p. 5; Philips, No. 8 at p. 2)

Since the publication of the August 2017 RFI, a 2020 version of IES LM-20 has been published. In this notice, DOE is proposing to update the currently referenced 1994 version of IES LM-20 to the 2020 version. DOE has tentatively determined that the updates identified in IES LM-20-2013 have been retained and no other key changes have been made in the 2020 version. Compared to the 2013 version, IES LM-20-2020 mainly updates references to other industry standards.

IES LM-20-2013 adds new definitions (*e.g.* extraneous light, undirected light) and makes minor updates to existing definitions (*e.g.* beam axis, central cone, stray light). The 2020 version maintains the definitions in IES LM-20-2013. DOE has tentatively determined these changes to definitions do not change the essential meaning of the terms or their usage in the test methods.

Section 8.0 of IES LM-20-2020 provides more updated information regarding minimizing errors when calibrating the integrating sphere and directly references IES LM-78-2020, the industry standard for measurements in an integrating sphere, for basic integrating sphere photometer calibration and measurements. Because DOE allows use of an integrating sphere to make necessary photometric measurements of IRLs, DOE is proposing to incorporate by reference IES LM-78-2020 for Appendix R and referencing section 8.0 of IES LM-20-2020 directly in its revisions to Appendix R (see section III.C.b). Further IES LM-20 references IES LM-54, the industry standard for lamp seasoning, with regard to seasoning lamps. Section 6.0 of

IES LM-20-2020 updates its references of IES LM-54 from the 1991<sup>37</sup> version to the 2020 version. DOE has tentatively determined that referencing the 2020 version of IES LM-54 will not change final measured values and proposes to incorporate the standard for Appendix R (see section 7). Because lamp seasoning is a necessary part of testing IRLs, DOE is proposing to incorporate by reference IES LM-54-2020 for Appendix R and to reference section 6.2 of IES LM-20-2020 directly in its revisions to Appendix R (see section III.C.a).

IES LM-20-2020 references IES LM-45-2020 for ambient temperature and instrumentation conditions and lamp connections and circuits while IES LM-20-1994 references IES LM-45-1991. Compared to the 1991 version, IES LM-45-2020 changed the temperature tolerance from +/- 1 degree to +/- 10 degrees. IES LM-45-2020 also states that maintaining temperature is not critical for incandescent filament lamps. Because incandescent filament lamps are not sensitive to small temperature changes, DOE has tentatively determined that the change in temperature tolerance would not impact final measured values. Additionally, IES LM-45-2020 omits the statement that instruments will have an accuracy of at least 0.25 percent, instead referencing instrument manuals and specifying instrumentation tolerances; tightens the DC supply voltage tolerance from 0.1 to 0.02 percent; provides specific impedance tolerances for supply voltages and currents; and specifies tolerances for detectors to measure lumens. DOE has tentatively concluded that test labs typically adhere to the specifications in instrument manuals as a best practice. Further the changes and addition of tolerances provide greater specificity in the calibration of instruments, increasing repeatability and reproducibility. DOE has tentatively concluded that these updates would not impact final measured values. IES LM-45-2020 also adds basic lamp connection and circuit information including circuit diagrams for AC and DC connections to a lamp. Because the lamp to instrumentation connections for incandescent lamps

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<sup>37</sup> Illuminating Engineering Society of North America, *LM-54 Lamp Seasoning*, Approved June 1991.

are relatively simple, the circuit information and directions provided are likely already being followed by test laboratories to test IRLs.

IES LM-20-2020 also references IES LM-45-2020 for lamp stabilization procedures while IES LM-20-1994 only states that lamps should be seasoned to provide necessary stabilization. IES LM-45-2020 provides a method commonly used in industry for establishing lamp stability. The method requires determining the average percent difference of maximum and minimum measurements at several regular intervals and ensuring it is within a certain tolerance. Laboratories are likely already following a method like the one prescribed in IES LM-45-2020 to ensure stability of IRLs before taking measurements. Hence, DOE has tentatively concluded that the requirement of a specific stabilization method only explicitly references a procedure that is already being followed.

In summary, DOE has tentatively concluded that changes in IES LM-20-2020 would not change measured values. DOE proposes that manufacturers would not be required to retest and would be able to continue to rely upon test data previously conducted in accordance with the DOE test procedure. Hence, DOE proposes to update references from the 1994 version of IES LM-20 to the 2020 version in 10 CFR 430.3 for Appendix R.

## 6. IES LM-9

Sections 3.1, 4.1.1, and 4.4 of Appendix R specify that, for GSFLs, test conditions, methods, and measurements must be conducted in accordance with the 2009 version of IES LM-9. IES LM-9 provides methods for taking electrical and photometric measurements of fluorescent lamps. The latest version of the industry standard, IES LM-9-2020 was not available for analysis and requests for comment in the August 2017 RFI. DOE's initial review of this standard indicates no major changes in the 2020 version except for relevant updated references.

Section 6.2 of IES LM-9-2020 updates its reference of IES LM-54, the industry standard for lamp seasoning, from the 1999 version to 2020 version. DOE has tentatively determined that referencing the 2020 version of IES LM-54 will not change final measured values and proposes to incorporate the standard for Appendix R (see section 7). Because lamp seasoning is a necessary part of testing GSFLs, DOE is proposing to incorporate by reference IES LM-54-2020 for appendix R and to reference section 6.2 of IES LM-9-2020 directly in its revisions to Appendix R (see section III.C.a). Section 7.0 of IES LM-9-2020 updates its references of IES LM-78 from the 2007 to the 2020 version. DOE has tentatively determined that referencing the 2020 version of IES LM-78 will not change final measured values and proposes to incorporate the standard for Appendix R (see section 7). Because DOE allows use of an integrating sphere to make necessary photometric measurements of GSFLs, DOE is proposing to incorporate by reference IES LM-78-2020 for Appendix R and referencing section 7.0 of IES LM-9-2020 directly in its revisions to Appendix R (see section III.C.b).

In summary, DOE has tentatively concluded that updates in IES LM-9-2020 would not change final measured values. Therefore, DOE proposes to update references from the 2009 version of IES LM-9 to the 2020 version in Appendix R.

## 7. IES LM-54

IES LM-54 is the industry standard for lamp seasoning. Appendix R currently references sections of IES LM-45-2009 and IES LM-9-2009 which reference IES LM-54-1999; and sections of IES LM-20-1994 which reference IES LM-54-1991. The 2020 versions of IES LM-45, IES LM-9, and IES LM-20 proposed for incorporation by reference for Appendix R in this notice have updated this reference to IES LM-54-2020. The latest version of the industry

standard, IES LM-54-2020 was not available for analysis and requests for comment in the August 2017 RFI.

Compared to both the 1991 and 1999 versions, the 2020 version of IES LM-54 adds numerous new sections which codify best practices that labs are likely already following. The 2020 version adds a section on physical environment test conditions that covers topics such as keeping labs clean and within the ambient temperature range; not subjecting lamps to excessive vibration/shock; and using airflow to cool the seasoning area. The 2020 version also adds a section on electrical test conditions which includes instructions on frequency, voltage wave shape, and voltage regulation; basic lamp connection protocols; and setting up an adjacent ground for fluorescent lamps. Additionally, the 2020 version includes a new section on test preparation which addresses how to handle and mark lamps. Finally, the 2020 version adds a statement expressly stating that the orientation of the lamp during seasoning should be maintained for the entire test. In this NOPR, DOE is proposing to specify in Appendix R that lamp orientation be maintained throughout testing, including seasoning and lamp handling between tests (see section 2 for further details) for all test methods in Appendix R. These specifications in IES LM-54-2020 are similar to test conditions in other industry lamp standards. DOE has tentatively determined that the additions in IES LM-54-2020 are industry best practices for taking lamp measurements, and therefore likely are already being followed by laboratories.

DOE also identified updates to specifications in the 1991 version. The 1991 version states normal seasoning is generally performed at rated voltage for a period of 0.5 to 1 percent of rated life. The 2020 version states normal seasoning refers to lamp operation at rated voltage for 0.5 percent of rated life. Because 0.5 percent was already part of the range, DOE has tentatively concluded that this change will negligibly impact the seasoning of the lamp. Additionally, compared to the 1991 version, IES LM-54-2020 provides new accelerated seasoning times for

lamps with rated life of 100-499 hours and changes the accelerated seasoning time from 45 minutes to 30 minutes for lamps with lifetimes of 500-1000 hours. IES LM-54-2020 also provides equations to calculate more-precise estimates of accelerated seasoning time, which DOE understands to be minimum seasoning times. The 1991 version did not include these equations. These changes reflect a more precise assessment of accelerated seasoning time, requiring less seasoning for lamps with shorter lifetimes. DOE has tentatively concluded that these adjustments make the accelerated seasoning method more practical to follow and would negligibly impact the seasoning of the lamp.

## 8. IES LM-78

IES LM-78 is the industry standard for taking measurements in an integrating sphere. Appendix R currently reference sections of IES LM-45-2009 and IES LM-9-2009 which reference IES LM-78-2007. The 2020 versions of IES LM-45 and IES LM-9 proposed for incorporation by reference for Appendix R in this notice have updated this reference to IES LM-78-2020. The latest version of the industry standard, IES LM-78-2020 was not available for analysis and requests for comment in the August 2017 RFI.

DOE identified several changes in 2020 version of IES LM-78 compared to the 2007 version. The 2020 version includes a discussion of spectral measurements including a new section on taking measurements with a spectroradiometer within a sphere. IES LM-78-2020 also provides specific sections on  $2\pi$  and  $4\pi$  geometry. For  $4\pi$  geometry the 2020 version states the total surface area of the lamp should be less than 2 percent of the total area of the sphere wall. Regarding instrumentation, the 2020 version states that detectors other than silicon photodiodes are not recommended. IES LM-78-2020 adds an explanation on using sphere angular response distribution function (“SRDF”) to assess sphere responsivity. Further the equation to compute

luminous flux now includes subtraction of dark/stray light, a ratio of spectral mismatch correction factor to self-absorption factor, and the sphere angular non-uniformity correction factor. DOE has tentatively concluded that the additional information in IES LM-78-2020 is reflective of industry learning in making more accurate and consistent measurements using the integrating sphere but will not impact final measured values.

DOE also identified updates to specifications. The 2020 version states the sphere diameter be 1.5 times the length of a linear lamp whereas it was 2 times the length in the 2007 version. IES LM-78-2020 also states for the degree of the spectral match to the  $V(\lambda)$  function, it is preferable that the value of the photometer be less than 3 percent whereas it was less than 5 percent in the 2007 version. Throughout the standard the term spatial luminous intensity is replaced with angular luminous intensity. Finally, the uncertainty analysis section has been condensed to a list of potential sources of errors and references to other industry standards for guidance. DOE has tentatively concluded that these updates are minimal and will not impact final measured values.

## 9. CIE 15

Section 4.4.1 of Appendix R states that for incandescent lamps CCT shall be determined in accordance with the 2004 version of CIE 15. CIE 15 provides the International Commission on Illumination's recommendations concerning colorimetry (*i.e.*, the measurement of color). The latest version of the industry standard, CIE 15-2018 was not available for analysis and requests for comment in the August 2017 RFI. DOE's initial review indicates that CIE 15-2018, compared to its 2004 version, adds specifications regarding the following: standard observer data and cone-fundamental-based colorimetric observer data; indoor daylight illuminant spectra; smoothed D illuminants; LED illuminants; and geometry specification of colorimetry. The latest



version also makes updates to tables specifying spectral power distribution data and colorimetric data of illuminants. DOE has tentatively determined that the updates in CIE 15-2018 do not substantially change measurement of CCT for incandescent lamps and would not change final measured values. DOE requests comment on the impact on measured CCT values of incandescent lamps using CIE 15-2018 compared to the 2004 version of the standard.

### C. Proposed Amendments to Appendix R

DOE proposes changes to Appendix R to improve the organization of the test procedures, further clarify test conditions and measurement steps, and cite specific sections of referenced industry test standards. Note that the proposed section references of industry test standards are based on the version of the standard proposed for adoption (see section III.B). Additionally, DOE proposes to remove references to rounding and sample size from Appendix R, as these requirements are addressed in 10 CFR 429.27, and also to remove references to minimum lifetime standards as these are provided in 10 CFR 430.32(x)(1)(iii)(A)-(B). DOE details these proposed changes to Appendix R in the following sections.

#### 1. Definitions

DOE proposes to define certain new terms and modify certain existing terms in Appendix R. Specifically, DOE proposes to add “time to failure.” To support the test method in Appendix R for measuring lifetime of lamps that use incandescent technology, DOE proposes to define “time to failure” as the time elapsed between first use and the point at which the lamp ceases to produce measurable lumen output. This definition clarifies the time that must be measured to determine the lifetime of the lamp.

Additionally, DOE proposes four changes related to the definition of “lamp efficacy”: (1) to replace “lamp efficacy” with “initial lamp efficacy;” (2) to simplify this definition by referencing lamp efficacy as defined in 10 CFR 430.2; (3) to specify that the value is determined after the lamp is stabilized and seasoned; and (4) to remove references to rounding requirements, which are proposed to be addressed in 10 CFR 429.27 (see section 4 for details on DOE’s proposal to consolidate rounding requirements in 10 CFR 429.27). DOE also proposes to replace “lamp lumen output” with “initial lumen output” and to specify that it is the initial lumen output measured after the lamp is stabilized and seasoned. Similarly, DOE proposes to replace “lamp electrical power input” with “initial input power” and to specify that it is the initial input power measured after the lamp is stabilized and seasoned. These proposed changes more accurately describe the values being determined and measured by the test methods in Appendix R.

DOE also proposes to remove the term “reference condition” because it is neither referenced in nor necessary for the test procedure. Additionally, DOE proposes to remove definitions for “ANSI Standard,” “CIE,” and “IESNA” in Appendix R because 10 CFR 430.3 contains the relevant terms. Further, DOE proposes to remove definitions for “CCT” and “CRI” which only reference the definitions in 10 CFR 430.2.

DOE also proposes to update section references to definitions in industry test standards to align with the proposed updated versions by changing references to section 2 of IES LM-58-1994 to be references to section 3 of IES LM-58-2020 and to delete the reference to Glossary of IES LM-45-2015 as it no longer exists in the 2020 version.

## 2. General Instructions

To improve the readability of and streamline the test methods in Appendix R, DOE proposes to add a “General Instructions” section to specify test practices applicable to all lamps covered by the appendix.

To ensure consistency in measurements, DOE proposes to include in the “General Instructions” section specifications regarding: 1) conflicting requirements; 2) lamp orientation; 3) lamp breakage; and 4) rated voltage. First, DOE proposes that, where there is a conflict between requirements in referenced industry test standards and those in the appendix, the latter must take precedence. Second, DOE proposes that lamp orientation be maintained throughout testing, including seasoning and lamp handling between tests. Third, DOE proposes that, if a lamp breaks, becomes defective, fails to stabilize, exhibits abnormal behavior such as swirling<sup>38</sup> prior to the end of the seasoning period, or stops producing light, the lamp must be replaced with a new unit. DOE has tentatively concluded that these proposals only explicitly state best practices already being followed by labs for testing lamps, and would not change current requirements of the DOE test procedure.

Regarding instructions for rated voltage, in the August 2017 RFI, DOE noted that currently Appendix R requires that incandescent lamps be operated at the “rated voltage as defined in §430.2.” This definition of “rated voltage with respect to incandescent lamps” references the term “design voltage,” also defined in 10 CFR 430.2. The terms “rated voltage with respect to incandescent lamps” and the associated “design voltage with respect to incandescent lamps” are defined as follows in 10 CFR 430.2:

*Rated voltage* with respect to incandescent lamps means:

(1) The design voltage if the design voltage is 115 V, 130 V or between 115V and 130 V:

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<sup>38</sup> This term refers to the visual observation that a beam or line of light appears to be “swirling” or “spiraling” within a fluorescent tube lamp.

- (2) 115 V if the design voltage is less than 115 V and greater than or equal to 100 V and the lamp can operate at 115 V; and
- (3) 130 V if the design voltage is greater than 130 V and less than or equal to 150 V and the lamp can operate at 130 V.

*Design voltage* with respect to an incandescent lamp means:

- (1) The voltage marked as the intended operating voltage;
- (2) The mid-point of the voltage range if the lamp is marked with a voltage range; or
- (3) 120 V if the lamp is not marked with a voltage or voltage range.

10 CFR 430.2

DOE requested feedback on simplifying the test voltage requirements in these definitions and aligning them, to the extent possible, with DOE test procedure requirements for other lamp types such as CFLs and integrated LED lamps. Those test procedures require that CFLs and integrated LED lamps be tested at the voltage marked on the lamp as the intended operating voltage and if no voltage is marked to test at 120 volts (“V”); if multiple voltages are marked including 120 V to test at 120 V, and if multiple voltages are marked not including 120 V to test at the highest voltage. 82 FR 37031, 37035. DOE received several comments on modifying the required test voltage for incandescent lamps.

NEMA and LEDVANCE stated their support for simplifying the test voltage requirements for incandescent lamps with LEDVANCE adding that the requirement should also apply to IRLs. It is not clear whether NEMA intended to include IRLs in “incandescent lamps,” as NEMA did not specifically reference IRLs in its comments on test voltage requirements. Both parties added that DOE’s considered changes to test voltage specifications in the August 2017 RFI would have little practical impact on products that meet standards stating that, while there is

a reduction in efficiency when testing 130 V lamps at 120 V, there are no 130 V lamps on the market. (NEMA, No. 7 at p. 5; LEDVANCE, No. 5 at p. 5) Philips also posed no objections to modifying the required test voltage for incandescent lamps and referred to NEMA's comment on the subject. (Philips, No. 8 at p. 3)

However, CA IOUs expressed concern regarding modifying the requirement for lamps to be tested at the marked voltage. CA IOUs noted that GSILs are defined as lamps operating at least partially within 110 to 130 volts and with a minimum light output of 310 lumens (232 lumens for modified spectrum). Further, the 2017 GSL Definition Rules specified GSLs, which include GSILs and IRLs, as lamps operating between 100 to 130 V with a minimum light output of 310 lumens. CA IOUs argued that testing at the labeled voltage could allow lamps to be tested at a lower voltage producing less than the minimum lumens to be considered GSLs. (CA IOUs, No. 6 at p. 2) ASAP stated that for incandescent lamps an increase in voltage will lead to higher lumens, and some manufacturers may choose to label their lamps at a lower voltage than for which it was designed to avoid the minimum lumen requirements of a GSL. In particular, ASAP expressed concerns regarding re-rating by manufacturers for incandescent lamps with medium screw bases. ASAP added that allowing manufacturers to test lamps at labeled voltages not used in real applications could yield results that are not representative of actual performance for the vast majority of consumers. Regarding aligning with the CFL and integrated LED lamp test procedures, ASAP stated that CFLs and integrated LED lamps are often designed to maintain uniform power consumption and brightness across a range of operating voltages and therefore can be tested at the voltage marked on the lamp. Further ASAP stated that the current definition of "rated voltage with respect to incandescent lamps" and the associated "design voltage" terminology in 10 CFR 430.2 provides sufficient flexibility to accommodate different types of incandescent lamps while avoiding loopholes. (ASAP, No. 9 at pp. 2-3)

Based on feedback in response to the August 2017 RFI and further review, modifying the test voltage requirements in Appendix R to align with DOE test procedure requirements for CFLs and LED lamps would change the rated voltage for certain IRLs and potentially exclude them from the definition of IRL, which is defined as having a rated voltage or voltage range that lies at least partially in the range of 115 and 130 volts. Further, because energy conservation standards are in part determined by the rated voltage of the IRL, changes to rated voltage may subject lamps to different standards. Therefore, DOE proposes to maintain the current specifications for determining the test voltage of incandescent lamps as specified in the definition of “rated voltage with respect to incandescent lamps” in 10 CFR 430.2. DOE proposes to move this voltage specification currently codified as part of a definition to the “General Instructions” section of Appendix R to make it clear that it applies to GSIL and IRL test methods in Appendix R.

### 3. Test Method for Determining Initial Lamp Efficacy, CRI, and CCT

To improve the organization of the appendix, DOE proposes to create a section called “Test Method for Determining Initial Input Power, Initial Lumen Output, Initial Lamp Efficacy, CRI, and CCT” and include existing sections regarding these measurements as subsections.

#### a. Test Conditions and Setup

The test conditions and setup section of the test procedure provides specifications regarding the ambient, physical, and electrical conditions of the test setup. To convey this purpose DOE proposes to include the term “setup” in the title and modify the existing language to use the phrase “establish ambient, physical, and electrical conditions” consistently.

Additionally, for GSFLs, DOE proposes to move the specifications on appropriate voltage and current conditions and reference ballast settings from the “Test Methods and Measurements” section to “Test Conditions and Setup” as these requirements are part of the electrical conditions and setup that should be met prior to taking any measurements. Further as stated in section 1, DOE proposes to allow manufacturers to make voluntary representations for GSFLs that are based on high frequency reference ballast settings in the 2016 versions of ANSI C78.81 and ANSI C78.901. (These optional representations would be in addition to the required representations made in accordance with the DOE test procedure and would not be used to show compliance with minimum requirements.) In support of this testing, DOE proposes that, for voluntary high-frequency measurements, lamps would be required to operate using high frequency reference ballast settings in ANSI C78.81-2016 and ANSI C78.901-2016. Voluntary representations are described in a new section 5.0 in Appendix R.

Further, DOE proposes to clarify existing instructions regarding operation on low versus high frequency reference ballast settings and the inclusion of cathode power in measurements. For any lamp with an ANSI datasheet, if the datasheet includes low frequency settings, the test would occur using low frequency settings and DOE proposes to clearly state when to include cathode power. For any lamp with an ANSI datasheet that does not include low frequency settings, the test would occur using high frequency settings and cathode power would not be included. For any lamp with no ANSI datasheet, DOE proposes to add text that clarifies the frequency of operation and whether to include cathode power in calculations.

DOE proposes to specify that when operating at low frequency, cathode power must be included in the measurement if ANSI C78.81 or ANSI C78.901 classifies the circuit application as “rapid start.” If those industry test standards classify the circuit application as something other than “rapid start,” cathode power would not be included. DOE also proposes to specify

that cathode power must not be included in measurements when operating at high frequency.

DOE seeks comments on the usefulness of the proposed general clarification regarding cathode power for lamps found in ANSI C78.81 and ANSI C78.901 and any associated impacts on test burden.

Additionally, for lamps that do not have lamp data sheets in industry test standards, DOE provides reference ballast settings on which to test in Appendix R. DOE obtained these reference ballast settings from existing lamp data sheets of industry test standards for the lamp type most similar to the lamp type not contained in the industry test standard. However, Appendix R only specifies the reference ballast settings and does not indicate whether the test must be done at low or high frequency or include cathode power. DOE proposes to specifically state whether lamp types not included in industry test standards must be tested at low or high frequency to clarify that manufacturers only need to conduct one test and to indicate the frequency at which that test must occur. DOE also proposes to specify for these lamps whether cathode power must be included in the measurements. DOE bases this proposal on how the lamp types most similar to the lamp type not contained in the industry test standard are tested. DOE proposes to specify the following:

**Table III.2 Proposed Frequency and Cathode Power Test Specifications for GSFLs**

<b>Lamp Type</b>	<b>Test Frequency</b>	<b>Test with Cathode Power?</b>
4-foot medium bipin (T8, T10, T12)	Low	Yes
2-foot U-shaped (T8 and T12)	Low	Yes
8-foot slimline (T8 and T12)	Low	No
8-foot high output (T12)	Low	Yes
8-foot high output (T8)	High	No
4-foot medium bipin standard output and high output (T5)	High	No



DOE notes that if this proposal were finalized, DOE would expect manufacturers whose test data was not consistent with the specified cathode heat provisions would be required to retest. DOE seeks comments on the usefulness of the proposed clarification regarding the frequency of operation and inclusion of cathode power for lamps that do not have lamp data sheets in industry test standards and any associated impacts on test burden.

Appendix R currently references IES LM-9, IES LM-45, and IES LM-20 in their entirety for test conditions. DOE proposes to specify that ambient, physical, and electrical conditions be established as described in sections 4.0, 5.0, 6.1, 6.5 and 6.6 of IES LM-9 for GSFLs; sections 4.0, 5.0, 6.1, 6.3 and 6.4 in IES LM-45 for GSILs; and sections 4.0 and 5.0 of IES LM-20 for IRLs.

The proposed updates to test conditions and setup in Appendix R only reorganize or specify more exact industry reference to current specifications and would not change current requirements of the DOE test procedure.

#### b. Test Methods, Measurements, and Calculations

The section on test methods and measurements in the current Appendix R, in some cases, references industry test standards in their entirety. It also does not expressly state when to season and stabilize the lamps or take measurements or which measurements to take. DOE proposes to limit references of industry test standards to listed sections and to reorganize the section to provide a clear, step-by-step process of seasoning and stabilizing the lamp; taking the appropriate measurements of initial input power and initial lumen output; and making necessary calculations to determine values of initial lamp efficacy, CCT, and CRI.

### Seasoning and Stabilization

DOE proposes to state explicitly that lamps must be seasoned and stabilized according to section 6.2 in IES LM-45 for GSILs and section 6.0 in IES LM-20 for IRLs. These proposed updates only specify more exact industry reference to current specifications and will not change current requirements of the DOE test procedure.

In the August 2017 RFI, DOE requested information on the use of the “peak lumen method,” which is an alternative stabilization method referenced in IES LM-9, the industry test standard for non-CFL lamps that use fluorescent technology. 82 FR 37031, 37035. DOE received several comments on this method. NEMA and LEDVANCE explained that the peak lumen method is useful for lamps that have long stabilization times such as high output lamps. (NEMA, No. 7 at p. 5; LEDVANCE, No. 5 at p. 6) NEMA stated that, while the method is not used often since such lamps are not high volume, the method should be maintained because it improves throughput time in the laboratory. (NEMA, No. 7 at p. 5) LEDVANCE stated it did not employ the peak lumen method but had no objection to its use. (LEDVANCE, No. 5 at p. 6)

IES LM-9 states that through careful correlation tests it may be possible to relate peak to stabilized lumens by a constant that would be unique to each lamp type. IES LM-9 goes on to explain that the measured peak lumens of a lamp can be multiplied by this correction factor to determine stabilized lumens. Although industry feedback indicates that it is not a popular method, the “peak lumen method” can improve throughput time in the laboratory. Therefore, DOE proposes to continue to allow the “peak lumen method” as an alternative stabilization method.

For GSFLs, DOE proposes to state that lamps must be seasoned and stabilized in accordance with sections 6.1, 6.2, 6.3, and 6.4 of IES LM-9. These proposed updates only

specify the exact sections of an industry standard and would not change current requirements of the DOE test procedure.

### Photometric Measurements

In the August 2017 RFI, DOE requested information on allowing only the integrating sphere method and no longer allowing the goniophotometer (the combination of a goniometer and photometer) method for taking photometric measurements of GSFLs, IRLs, and GSILs. 82 FR 37031, 37035. Additionally, DOE requested comments on how frequently the industry uses the average intensity distribution curve method, which is the calculation of total lumen output based on the intensity measurements taken using the goniophotometer method for determining lumen output of IRLs. DOE received several comments on these topics.

NEMA supported, and LEDVANCE did not object to, allowing the goniophotometer and average intensity distribution curve methods in addition to the integrating sphere method. NEMA preferred to maintain the option of testing with a goniometer<sup>39</sup> stating that it was a better method for testing IRLs and also provided flexibility when the integrating sphere was otherwise occupied. NEMA also stated that, while the average intensity distribution curve method is little-used, it should be maintained as an option. (NEMA, No. 7 at p. 5) LEDVANCE stated that, while it uses the integrating sphere method for testing and certifying all the lamps including IRLs, LEDVANCE had no objections to maintaining the goniophotometer as a test method option because of the flexibility it provided. LEDVANCE stated that, while it did not use the average intensity distribution curve method, it had no objection to allowing it. (LEDVANCE, No. 5 at p. 6)

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<sup>39</sup> Industry use the term goniophotometer and goniometer interchangeably, but both refer to the same method in which a large mirror attached to an arm-like construction is rotated around the light source (goniometer) and the light that is reflected is detected and measured by a photometer.

CA IOUs stated their belief that, because GSLs are defined to include GSILs, CFLs, and general service LED lamps and all three lamp types will be subject to the same standard DOE should strive to harmonize test methods, where possible. Because only the integrating sphere method is allowed for CFLs and integrated LED lamps, the CA IOUs expressed support for allowing only this method for measuring light output of GSFLs, IRLs, and GSILs. (CA IOUs, No. 6 at p. 2)

Because alternative methods of measurement may provide logistical flexibility, even though they are little-used, DOE proposes to continue to allow the average intensity distribution method for reflector lamps and goniophotometers for all lamps in addition to the integrating sphere method. Thus, the proposal makes no change to the current test procedure. DOE proposes to specify that initial lumen output measurements be taken in accordance with section 7.0 in IES LM-9 for GSFLs, section 7.0 in IES LM-45 for GSILs, and section 7.0 or 8.0 in IES LM-20 for IRLs.

Additionally, for reflector lamps, DOE proposes to require measuring initial lumen output rather than total forward lumens (as it is currently described in Appendix R). DOE most recently discussed measuring an IRL's total forward lumens more than twenty years ago in a test procedure final rule published on May 29, 1997. 62 FR 29222, 29235. In that rulemaking proceeding, NEMA commented that the light output for IRLs should be measured as total forward lumens. 62 FR 29222, 29235. In a final rule published June 13, 1995, in response to a letter from NEMA containing a similar request for measurement in total forward lumens, the FTC amended its labeling requirements for IRLs to clarify "total forward lumens," instead of lumens "at beam spread." 60 FR 31077, 31079-31080. FTC concluded that light output disclosure should reflect useable light output reflected forward, and not merely forward light focused within the more narrow "beam spread" of the particular lamp. 60 FR 31077, 31080.

Neither IES LM-20-2013 nor IESNA LM-20-1994 uses the term “forward lumens.” However, based on FTC’s amendment, DOE tentatively finds that, because a reflector lamp is designed to focus lumens in a specific direction rather than in all directions, the term “total forward lumens” has the same meaning as “initial lumen output.” To align terminology with other lamp test procedures (*i.e.*, GSFLs, GSILs, CFLs, and LED lamps), DOE proposes to change the term “total forward lumens” to “initial lumen output” for IRLs in Appendix R.

### Determining CRI and CCT

DOE proposes to include a test method for determining CRI for lamps that use incandescent technology. Because there is a minimum CRI requirement for GSILs (see 10 CFR 430.32(x)(1)), and manufacturers are required to certify CRI values for GSILs (see 10 CFR 429.27(b)(2)(iii)), DOE proposes to include a test method for determining CRI of GSILs in Appendix R. In addition, the Energy Independence and Security Act (“EISA”) of 2007 established a CRI requirement for IRLs.<sup>40</sup> Hence, DOE also proposes to include a test method for determining CRI of IRLs in Appendix R. Specifically, DOE proposes to require that CRI of GSILs be determined in accordance with section 7.4 in IES LM-45 and CIE 13.3 and that CRI of IRLs be determined in accordance with CIE 13.3. Because CIE 13.3 is the industry test standard for testing CRI of all lamps, CRI is likely already being measured in accordance with this standard. Hence, DOE has tentatively concluded that the proposed test method for CRI is only establishing procedures already being followed.

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<sup>40</sup> Section 321(a) of EISA 2007 established CRI requirements for lamps that are intended for a general service or general illumination application (whether incandescent or not); have a medium screw base or any other screw base not defined in ANSI C81.61-2006; are capable of being operated at a voltage at least partially within the range of 110 to 130 volts; and are manufactured or imported after December 31, 2011.

For GSFLs, Appendix R currently requires CRI to be determined in accordance with CIE 13.3. (Section 4.4.1 of Appendix R). For completeness, DOE proposes to state that, in addition to CIE 13.3, the CRI of GSFLs be determined in accordance with section 7.6 in IES LM-9.

Currently Appendix R requires CCT for GSFLs to be determined in accordance with IES LM-9, and CCT for incandescent lamps to be determined in accordance with CIE 15. *Id.* DOE proposes to require that CCT of GSFLs be determined in accordance with section 7.6 in IES LM-9 and CIE 15; CCT of GSILs be determined in accordance with section 7.4 in IES LM-45 and CIE 15; and CCT of IRLs be determined in accordance with CIE 15. Section 7.6 of IES LM-9 states that color measurements are based on chromaticity coordinates and CRI as defined by CIE standards.

#### 4. Test Methods, Measurements, and Calculations for Determining Time to Failure

To improve the organization of the appendix, DOE proposes to create a section called “Test Method for Determining Time to Failure for General Service Incandescent Lamps and Incandescent Reflector Lamps” and subsections, “Test Conditions and Setup,” and “Test Methods, Measurements, and Calculations.” To clarify the existing test method for determining the time to failure of GSILs and adopt the same test method for determining time to failure of IRLs, DOE proposes to include information on test conditions, seasoning and stabilization, and remove information not pertinent to determining the time to failure value of the lamp.

Currently Appendix R requires measuring lifetime of GSILs in accordance with IES LM-49 and does not provide a test procedure for measuring lifetime of IRLs. DOE proposes to measure lifetime of IRLs in accordance with IES LM-49 and use the same methods as for GSIL lifetime testing. To improve the clarity of the existing instructions for GSIL lifetime testing and the proposed instructions for IRL lifetime testing, DOE proposes to reference specific sections of

the industry standards to execute the steps in determining lifetime for GSILs and IRLs. To specify the ambient, physical, and electrical conditions, DOE proposes to reference sections 4.0 and 5.0 of IES LM-49. DOE also proposes to specify that the lamps must be seasoned and stabilized and reference section 6.2 of IES LM-45 for these procedures. Also, as explained in section 1, DOE is proposing to replace “lifetime” with the term “time to failure,” which would be defined as the time elapsed between first use and the point at which the lamp ceases to produce measurable lumen output (see section 1). This provides more precision regarding the point at which measurements must be taken. Further, DOE proposes to require measuring “time to failure” in accordance with section 6.0 of IES LM-49 (see section 1). (DOE is also proposing to use the term “time to failure” to describe the represented value for lifetime; see section III.D). Additionally, because accelerated lifetime testing is described in section 6.4 of the latest version of IES LM-49 proposed for adoption in this notice, DOE proposes to update the existing reference to section 6.1 to be section 6.4 of IES LM-49 in the provision disallowing accelerated testing. Finally, because it relates to the standard rather than the test procedure, DOE proposes to remove language stating that the lamp will be deemed to meet minimum rated lifetime standards if greater than 50 percent of the sample size meets the minimum rated lifetime from appendix R.

DOE has tentatively determined that these proposed updates would not change current requirements for testing lifetime of GSILs, as the updates only explicitly state certain steps of the referenced industry standard for determining time to failure for incandescent lamps and provide the associated section references to an industry test standard already incorporated by reference. DOE tentatively determines that because the proposed requirements for testing lifetime of IRLs reference IES LM-49, the industry standard for testing lifetime of incandescent lamps, they are not substantively different from those manufacturers are currently using to conduct this test.

## 5. References to Industry Test Standards

NEMA recommended DOE adopt industry test standards “without modification” because testing according to both modified industry test standards in DOE test procedures and to original industry test standards for other programs such as ENERGY STAR or the State of California’s standards increases burden. NEMA added that following a single test procedure for all these programs minimizes risk of errors. (NEMA, No. 7 at p. 2) Philips agreed, citing the test lab costs for setting up protocols for modified industry test standards and the potential of erroneously using the modified industry test standard to test a product for non-DOE purposes. (Philips, No. 8 at p. 2) LEDVANCE agreed, adding that adopting industry test standards without modification streamlines and simplifies testing requirements. (LEDVANCE, No. 5 at p. 6)

In this document, DOE is only updating referenced industry test standards to the latest versions and including more specific section references of these industry test standards. Further, the potential of adopting a test procedure that is different from other programs should not add to test burden for these lamp types. Because the ENERGY STAR program does not include lamps that operate on an external ballast, its test method would not apply to the GSFLs subject to DOE’s test procedures. ENERGY STAR also does not include any incandescent lamp types.<sup>41</sup> Manufacturers also do not need to conduct separate tests for California requirements because the California Energy Commission regulations refer to the DOE test procedures for testing general service fluorescent lamps, general service incandescent lamps, and incandescent reflector lamp types (see 20 California Code of Regulations 1604<sup>42</sup>).

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<sup>41</sup> ENERGY STAR® Program Requirements Product Specification for Lamps (Light Bulbs) Eligibility Criteria Version 2.0. February 2016.  
<https://www.energystar.gov/sites/default/files/asset/document/ENERGY%20STAR%20Lamps%20V2%20Revised%20Spec.pdf>

<sup>42</sup> California Code of Regulations. “Test Methods for Specific Applications.”  
[https://govt.westlaw.com/calregs/Document/I90BAEA80D44E11DEA95CA4428EC25FA0?viewType=FullText&originationContext=documenttoc&transitionType=CategoryPageItem&contextData=\(sc.Default\)](https://govt.westlaw.com/calregs/Document/I90BAEA80D44E11DEA95CA4428EC25FA0?viewType=FullText&originationContext=documenttoc&transitionType=CategoryPageItem&contextData=(sc.Default))



#### D. Amendments to 10 CFR 429.27, 10 CFR 429.33 and 10 CFR 430.2

DOE proposes to modify language in 10 CFR 429.27, which sets forth the sampling, certification, and rounding requirements for GSFLs, IRLs, and GSILs, to improve clarity and organization and ensure it supports the labeling requirements for lamps established by the FTC. DOE also proposes changes to definitions in 10 CFR 430.2 to align better with terminology proposed in Appendix R and 10 CFR part 429. Further, DOE proposes to separate each lamp type by creating two new sections in 10 CFR part 429. This will add clarity and allow DOE to treat represented values differently depending on the product. Although the paragraphs below describe changes to 10 CFR 429.27, the changes for each lamp type will appear in separate sections in 10 CFR part 429. DOE also proposes to revise 10 CFR 429.33 to replace references to 10 CFR 429.27 with references to the proposed, separate sections for each lamp type.

##### 1. Definitions

To provide further clarity to the test procedure DOE is making several updates to definitions including revising the definition of “basic model;” references and definition of “rated;” and updating definitions of different IRL types.

##### Definitions of “Basic Model”

DOE proposes to update the definition of “basic model” in 10 CFR 430.2 to replace “lumens per watt (lm/W)” with “lamp efficacy.” This improves clarity by using the name of the metric instead of the unit of measure. Lamp efficacy is already defined elsewhere in 10 CFR 430.2 as being expressed in terms of lumens per watt.

##### Definitions and References of “Rated”

DOE proposes to replace references of “rated lumen output” and “rated lifetime” in 10 CFR 429.27 with, respectively, “initial lumen output” and “lifetime.” The term “rated” can lead to misunderstanding to the extent a reader interprets it as a standardized value rather than one that is determined through measurements. DOE requests comments on replacing “rated lumen output” and “rated lifetime” with, respectively, “initial lumen output” and “lifetime.”

The term “rated lifetime for general service incandescent lamps” is defined in 10 CFR 430.2 in relevant part as “the length of operating time of a sample of lamps,” as defined in 10 CFR 429.27, “between first use and failure of 50 percent of the sample size,” as determined in accordance with Appendix R. To align with proposed requirements in 10 CFR 429.27 for determining lifetime, DOE proposes to remove the term “rated.” Additionally, because the term “lifetime” rather than “lifetime for general service incandescent lamps” is used in 10 CFR 429.27, DOE also proposes to remove “for general service incandescent lamps.” DOE also proposes to modify the definition to “the length of operating time between first use and failure of 50 percent of the sample units (as specified in 10 CFR 429.27 of this chapter), determined in accordance with the test procedures described in Appendix R to subpart B of this part.”

“Rated wattage” for GSILs and IRLs is defined in 10 CFR 430.2 as the electrical power measured according to Appendix R. If there is no lamp datasheet for a type of GSFL in one of the referenced ANSI standards, “rated wattage” for GSFLs is defined as the electrical power of a lamp when measured according to the test procedures outlined in Appendix R. To align with 10 CFR 429.27, DOE proposes to clarify this definition by replacing the references to Appendix R with references to the relevant sections in 10 CFR part 429 and replacing “electrical power” with “initial input power.” DOE requests comments on the proposed definition of “lifetime” and modification to the definition of “rated wattage” in 10 CFR 430.2.

In the provisions for determining the represented value of rated wattage for GSFLs, GSILs, and IRLs, DOE proposes to change to “rated wattage” in any current references to "rated lamp wattage," for consistency within 10 CFR part 429 and to conform to the relevant term used in the energy conservation standards in 10 CFR 430.32.

Finally, in the provisions for determining the rated wattage of GSILs, DOE proposes to change how to determine the 95-percent upper confidence limit from using a two-tailed confidence interval to a one-tailed confidence interval. A two-tailed confidence interval test is typically utilized to determine whether a set of results could be either higher or lower while a one-tailed confidence interval test is typically utilized to determine whether a set of results are going in one specific direction (*i.e.*, either higher or lower). All represented values of lamp metrics required by DOE are either the greater of or lower of the mean or the upper/lower confidence limit of the results - depending on how the consumer may value that metric. (For example, where lower values are favored, such as wattage, the represented value is greater of the mean or upper confidence limit of the results.) Currently any represented value of rated wattage for a GSIL is the greater of the mean or the upper 95-percent confidence limit. Because DOE is interested in the greater value from the tested results for wattage, a one-tailed confidence interval rather than two-tailed confidence interval test is appropriate. The proposed change to a one-tailed confidence interval will also align the represented value determination of rated wattage of GSILs with all other represented value determinations of lamp metrics. DOE requests comment on its proposed changes to the provisions for determining the represented value of rated wattage for GSFLs, GSILs, and IRLs.

#### Definitions of IRL types

On May 1, 2020 DOE published an RFI document seeking comments to inform its determination of whether the standards for IRLs need to be amended. 85 FR 25326. In response

to the RFI, DOE received several comments on the definitions of different types of IRLs. CA IOUs recommended that DOE update the industry references in 10 CFR 430.2 for the definitions of bulged parabolic reflector (“BPAR”), reflector (“R”)20, elliptical reflector (“ER”), and bulged reflector (“BR”) lamps with the latest versions of ANSI C78.21-2011(R2016)<sup>43</sup> and ANSI C78.79-2014 (R2020)<sup>44</sup> to ensure that the latest industry standards and definitions are reflected. (CA IOUs, No. 8 at p. 4) NEMA supported the use of ANSI C78.21-2011 (R2016) as the current industry reference for reflector shape lamps. NEMA stated that colored lamps, lamps designed for rough or vibration service applications, and lamps that are R20 short type should remain excluded from the IRL definition. (Docket No. EERE–2019–BT–STD–0030, NEMA, No. 6 at p. 2)

DOE agrees with CA IOUs and NEMA on updating the CFR references with the latest versions of the currently referenced industry standards. Therefore, in this notice, DOE proposes to update the definitions in 10 CFR 430.2 for the BPAR, R20, ER, and BR incandescent reflector lamps with references to the latest versions of the currently referenced industry standards. Additionally, DOE is proposing definitions for R and parabolic aluminized reflector (“PAR”) incandescent reflector lamps that reference ANSI C78.21-2011 (R2016). Accordingly, DOE proposes to incorporate by reference ANSI C78.21-2011 (R2016) and ANSI C78.79-2014 (R2020) for 10 CFR 430.2.

## 2. Sampling Requirements

DOE proposes certain clarifying and organizational modifications to the sampling provisions in 10 CFR 429.27(a). First, to be consistent with sampling requirement language for

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<sup>43</sup> American National Standards Institute, *ANSI C78.21-2011(R2016) American National Standard for Incandescent Lamps-PAR and R Shapes*, Approved August 23, 2016.

<sup>44</sup> American National Standards Institute, *ANSI C78.79-2014(R2020) American National Standard for Electric Lamps – Nomenclature for Envelope Shapes Intended for Use with Electric Lamps*, Approved January 17, 2020.

other lamp types (*i.e.*, CFLs and integrated LED lamps), DOE proposes to state explicitly that represented values and certified ratings must be determined in accordance with the sampling provisions described in 10 CFR part 429.

DOE also proposes to require using the same sample of units as the basis for representations for all metrics for each basic model.

DOE proposes to change the minimum sample size from 21 lamps to 10 lamps and to remove the requirement that a minimum of three lamps be selected from each month of production for a minimum of 7 out of a 12-month period. Removing the latter provision would reduce confusion and burden. First, the 12-month requirement has led to confusion among manufacturers who interpreted this to mean DOE requires re-testing every calendar year. Second, selecting a few sample units from multiple months of the year can be difficult to coordinate and execute. In particular, if a manufacturer does not initially know the number of months in which it will produce the basic model, it would need to reserve lamps from each production month and later decide how many to test. In light of these considerations, DOE proposes to remove this requirement and instead align the minimum number of sample units with the requirements for other lighting products. Reflecting this change, DOE also proposes to eliminate the requirement to identify the production months of sample units in 10 CFR 429.27(c) by providing the production date codes and accompanying decoding schemes for all test units. DOE does not believe this change would require manufacturers to retest products. Current certifications based on 21 lamps would meet the proposed requirement to base certification on a minimum of 10 units. However, manufacturers would likely choose to test fewer lamps when they certify new products and therefore save testing costs. The expected cost savings are described in section III.H. DOE requests comments on its proposal to reduce the minimum

sample size and remove the requirement that a minimum of three lamps be selected from each month of production for a minimum of 7 months out of a 12-month period.

Because sample units would no longer have to be selected over a 12-month period, DOE is also proposing to remove the requirement in 10 CFR 429.12(e)(2) to submit an initial certification report prior to or concurrent with the distribution of a new basic model for GSFLs and IRLs. Instead, for GSFLs and IRLs, the complete certification report described in 10 CFR 429.12(b) would be required at that time. In addition, DOE expects that a manufacturer would complete the testing needed to submit a certification of compliance with standards prior to distribution in commerce, so a subsequent report would not be needed to reflect additional test results. DOE requests comments on its proposal to remove the submission of an initial certification report for GSFLs and IRLs.

### 3. Represented Value Determinations

DOE proposes to add specifications for determining the represented values of certain metrics. Under the FTC lighting facts labeling requirement, manufacturers of GSILs and IRLs are required to include on the lamp packaging basic and consistent information, including lumen output, wattage, life, CCT, and costs of annual energy consumption. 16 CFR 305.23(b) In support of FTC labeling requirements for GSILs and IRLs, DOE proposes adding determinations for the represented values of life (in years), estimated annual energy cost (in dollars per year), CCT, wattage (for IRLs only), and initial lumen output (for IRLs only).

Specifically, DOE proposes represented values of life (in years) for GSILs and IRLs be determined by dividing the represented lifetime of these lamps as determined by DOE requirements in 10 CFR part 429 by the estimated annual operating hours as specified by FTC in 16 CFR 305.23(b)(3)(iii). To support this calculation, DOE proposes that lifetime for IRLs be

determined as equal to or less than the median time to failure of the sample. DOE proposes represented values of estimated annual energy cost (in dollars per year) for GSILs and IRLs be determined in accordance with FTC requirements (*i.e.*, a usage rate of 3 hours per day, and 11 cents (\$0.11) per kWh) using the average initial wattage for the tested sample of lamps (see 16 CFR 305.23(b)(3)(ii)). DOE proposes the represented values of CCT for GSILs and IRLs be determined as the mean of the sample. Because consumers would favor a higher value for initial lumen output, DOE proposes represented values of initial lumen output for IRLs be determined as less than or equal to the lower of the mean or the lower confidence limit of the sample. DOE proposes the represented value of wattage for IRLs be determined as the mean of the sample. Because IRL wattage is used to determine which lamps are subject to DOE standards, the mean (average) of measured values is appropriate and confidence limits need not be applied.

Additionally, DOE's current test procedure for GSFLs includes measurement of wattage and CCT and in this notice DOE is proposing a test procedure for measuring CRI of IRLs (see section III.C.3). To support these test procedures, DOE proposes to provide instructions on determining the represented values for wattage and CCT of GSFLs and CRI for IRLs. Because consumers would favor a higher value for CRI, DOE proposes represented values of CRI for IRLs be determined as less than or equal to the lower of the mean or the lower confidence limit of the sample. DOE proposes the represented value of wattage and CCT for GSFLs be determined as the mean of the sample. Because GSFL wattage and CCT are used to determine which lamps are subject to DOE standards, the mean (average) of measured values is appropriate and confidence limits need not be applied.

Further, DOE is proposing revisions to the existing represented value determinations of initial lumen output for GSILs and CRI for GSFLs. DOE proposes to revise the current instruction to average the measurements of lumen output for GSILs. Because GSIL energy

conservation standards are based on initial lumen output and consumers would favor a higher value for this metric, DOE proposes the represented initial lumen output be less than or equal to the lower of the mean or the lower confidence limit. DOE proposes to revise the current instruction to apply the lower confidence limit to determine CRI for GSFLs. Because CRI can determine which lamps are subject to DOE standards, the mean (average) of measured values is appropriate and confidence limits need not be applied. DOE proposes the represented value of CRI for GSFLs to be determined as the mean of the sample.

Finally, DOE is proposing changes to clarify the determination of the represented value of lifetime for GSILs. DOE proposes to remove language stating that lifetime is the length of operating time between first use and failure of 50 percent of the sample size. Instead DOE proposes to state that the represented value of lifetime is equal to or less than the median time to failure of the sample. For an odd sample size, the median time to failure is simply the middle unit's time to failure. For an even sample size, it is the arithmetic mean of the time to failure of the two middle samples. DOE also proposes this clarified determination of represented value of lifetime for IRLs.

#### 4. Reporting requirements

In line with the proposed amendments to sampling requirements (see section III.D.2), DOE is proposing to remove the requirement to report production dates of units tested for GSFLs, IRLs, and GSILs. Additionally, DOE is proposing to clarify currently reported values for GSFLs, IRLs, and GSILs by removing "12-month average" from the description.

Further to align with the proposed method of referencing wattage (see section III.D.1), DOE is clarifying the description of "lamp wattage" so that it instead reads as "rated wattage" for GSFLs, IRLs, and GSILs. To align with proposed method of referencing lifetime (see section



III.D.1), DOE is clarifying the description of “average minimum rated lifetime” so that it instead reads as “lifetime” for GSILs.

## 5. Rounding requirements

For completeness and clarity, DOE proposes to specify rounding requirements for all represented values. DOE proposes to require rounding initial input power to the nearest tenth of a watt, initial lumen output to three significant digits, CRI to the nearest whole number, and lifetime to the nearest whole hour. DOE proposes to modify the CCT rounding requirement to the nearest 100 Kelvin. Currently Appendix R requires rounding lamp efficacy to the nearest tenth of a lumen per watt and CCT to the nearest 10 Kelvin. These updates to rounding requirements align with other DOE lamp test procedures such as CFLs and integrated LED lamps, and DOE has tentatively determined they provide the necessary level of precision for evaluating compliance with the applicable metric(s).

DOE proposes to move the rounding requirements for lamp efficacy and CCT from Appendix R to part 429. DOE also proposes to consolidate all rounding provisions in a single paragraph in the relevant product-specific section in part 429, subpart B.

### E. Amendments to 10 CFR 430.23(r)

Test procedures and measurements for GSFLs, IRLs, and GSILs are specified in 10 CFR 430.23(r). This section includes calculations and appropriate section references to Appendix R for determining annual energy consumption, lamp efficacy, CRI, and lifetime for GSFLs, GSILs, and IRLs, as applicable. Because calculations for determining these metrics are already

established in Appendix R, DOE proposes to remove them from §430.23(r). Additionally, DOE proposes to reference Appendix R in general rather than specifying sections, so that any future amendments to sections in Appendix R do not require changes in 10 CFR 430.23(r). Finally, DOE proposes to remove all references to annual energy consumption as this metric is not required by DOE. DOE proposes to replace the current language in 10 CFR 430.23(r) with a requirement to measure initial lumen output, initial input power, initial lamp efficacy, CRI, CCT, and time to failure in accordance with Appendix R.

#### F. Conforming Amendments to Energy Conservation Standard Text at 10 CFR 430.32

To avoid confusion and align with the proposed new terminology for Appendix R and 10 CFR 429.27, DOE proposes to modify certain terms related to the energy conservation standards for GSFLs, IRLs, and GSILs. The tables in 10 CFR 430.32(n)(6) and 10 CFR 430.32(x) provide the energy conservation standards for IRLs and GSILs, respectively, where the wattage terms are measured values. For IRLs, DOE proposes to change “rated lamp wattage” to be “rated wattage” in 10 CFR 430.32(n)(6). Also, in existing footnote 1 in the table in 10 CFR 430.32(n)(6), DOE proposes to specify the “P” in the minimum standard equation as “rated wattage” rather than “rated lamp wattage.” For GSILs, DOE proposes to change the term “maximum rate wattage” to “maximum rated wattage” in 10 CFR 430.32(x).

Further, for GSIL standards in 10 CFR 430.32(x), DOE proposes to remove the term “rated” from “rated lumen ranges” and add an explanatory footnote to use the measured initial lumen output to determine the applicable lumen range. Finally, DOE proposes to remove the term “rate” from “minimum rate lifetime” and add an explanatory footnote stating to use lifetime determined in accordance with 10 CFR 429.27 to assess compliance with this standard. The use of “initial lumen output” and “lifetime” aligns with the proposed terminology for Appendix R

and 10 CFR 429.27. DOE tentatively finds that the proposed changes to terminology in GSFL, IRL and GSIL energy conservation standards do not change the existing requirements but only clarify how measured values relate to the requirements in §430.32.

Additionally, DOE proposes to remove the lamp efficacy requirements for GSFLs manufactured after May 1, 1994, and November 1, 1995, and on or before July 14, 2012, listed in 10 CFR 430.32(n)(1) and for IRLs manufactured after November 1, 1995, and on or before July 14, 2012, listed in 10 CFR 430.32(n)(5). Eight years ago, new standards superseded these standards, and there are likely no units on the market to which they apply.

Finally, DOE proposes to change the subparagraph numbering in 10 CFR 430.32(x) as follows: 10 CFR 430.32(x)(1)(iii)(A) and (B) to respectively 10 CFR 430.32(x)(2) and (3); and subsequently renumber 10 CFR 430.32(x)(2) and (3) to 10 CFR 430.32(x)(4) and (5). This will reduce any confusion that standards under these subparagraphs are applicable only for lamps that fall under 10 CFR 430.32(x)(1)(iii).

#### G. Test Burden

DOE received several comments regarding the test burden resulting from updated test procedures for GSFLs, GSILs, and IRLs.

NEMA and LEDVANCE stated that to reduce test burden DOE should eliminate the annual sampling, testing, and reporting requirement for GSFL, GSIL, and IRL basic models and require only reporting to CCMS when products change, or are removed from or introduced into the market. (NEMA, No. 7 at p. 6; LEDVANCE, No. 5 at p. 6)

DOE does not require manufacturers to retest a basic model annually. The initial test results used to generate a certified rating for a basic model remain valid as long as the basic model has not been modified from the tested design in a way that makes it less efficient or more consumptive, which would require a change to the certified rating. 10 CFR 429.12(e). If a manufacturer has modified a basic model in a way that makes it more efficient or less consumptive, new testing is required only if the manufacturer wishes to make representations of the new, more efficient rating. DOE does require that manufacturers report certified values for a basic model even if the previously submitted certified value has not changed and retesting is not required. See 10 CFR 429.12(a). Because this should only entail resubmitting existing documents, DOE has tentatively concluded that the test burden of this requirement is minimal.

NEMA, LEDVANCE, and Philips stated that amending test procedures will not induce manufacturers to undertake any innovation efforts for these products. NEMA and LEDVANCE added that any amendments to test procedures could increase, rather than decrease, test burden. LEDVANCE added that all its research and development is being conducted in SSL products. Along these lines, NEMA stated that DOE should carefully consider burden when determining whether to update test procedures for highly mature products. (NEMA, No. 7 at p. 6, LEDVANCE, No. 5 at p. 7; Philips, No. 8 at p. 3) CA IOUs stated that, where there are conflicts, inaccuracies or outdated references, DOE should make updates to test procedures as needed regardless of perceived test procedure burdens. CA IOUs asserted that test procedures should be comprehensive and reflect real-world usage or would become burdensome in the long-term, particularly as multiple product standards evolve such as the ENERGY STAR®, California Title 20 requirements, and California Title 24 requirements. (CA IOUs, No. 6 at pp. 1-2)

DOE's proposed updates to its test procedures in Appendix R and associated sections to update references to industry test standards and to clarify the language and organization of the

test procedures are not related to product innovation. DOE has tentatively determined that these proposed updates will not increase test burden. As discussed in section III.B, updates in the latest versions of industry test standards do not substantively impact test methods. Further, in proposing language that clarifies definitions, test conditions, measurements/calculations, sampling, and certification requirements, DOE seeks to make the test procedures easier and clearer to follow. Additionally, DOE is providing test methods for measuring the CRI of incandescent lamps to support existing statutory requirements and for determining the lifetime of incandescent reflector lamps to support FTC labeling requirements. Written representations of these values are already required; CRI is a value reported for GSILs and life (in years) is required on FTC Lighting Facts labels. Finally, DOE is proposing to revise the sampling requirements such that fewer lamps need to be tested (see section III.D) which would result in cost savings for manufacturers as they certify new products to DOE. DOE has tentatively concluded that the proposed amendments in this notice clarify existing test procedures and result in cost savings (see section III.H).

DOE requests comment on its tentative determination that its proposed updates for GSFLs, IRLs, and GSILs will not increase test burden because determining these values to ascertain compliance with applicable DOE standards or FTC labeling requirements is already required by regulation and/or statute.

#### H. Test Procedures Costs and Harmonization

##### 1. Test Procedure Costs and Impacts

In this NOPR, DOE proposes to amend the existing test procedures for GSFLs, IRLs, and GSILs by updating to the latest versions of the referenced industry test standards and providing cites to specific sections of these standards; providing further specifications for definitions, test

conditions, test methods, and measurement procedures; clarifying test frequency and inclusion of cathode power in measurements; revising the sampling requirements; aligning sampling and certification requirements with proposed test procedure terminology; providing a test method for measuring the CRI of incandescent lamps and for measuring lifetime of incandescent reflector lamps; and allowing manufacturers to make voluntary (optional) representations of GSFLs at high frequency settings. DOE has tentatively determined that these proposed amendments to the GSFL, IRL, and GSIL test procedures, if finalized, would impact testing costs as shown in Table III.3 and Table III.4.

**Table III.3 Summary of Cost Impacts for GSFLs, IRLs, and GSILs**

<b>Category</b>	<b>Present Value (thousands 2016\$)</b>	<b>Discount Rate (percent)</b>
<b>Cost Savings</b>		
Reduction in Testing Costs	\$8,472	3
	\$3,239	7
<b>Total Net Cost Impacts</b>		
Total Net Cost Savings	(\$8,472)	3
	(\$3,239)	7

**Table III.4 Summary of Annualized Cost Impacts for GSFLs, IRLs, and GSILs**

<b>Category</b>	<b>Annualized Value (thousands 2016\$)</b>	<b>Discount Rate (percent)</b>
<b>Annualized Cost Savings</b>		
Reduction in Testing Costs	\$254	3
	\$227	7
<b>Total Net Annualized Cost Impacts</b>		
Total Net Cost Savings	(\$254)	3
	(\$227)	7

Further discussion of the cost impacts of the proposed test procedure amendments are presented in the following paragraphs.

The proposed amendments are primarily providing updates and clarifications for how to conduct the test procedure and do not add complexity to test conditions/setup or add test steps. For example, this notice adds references to specific sections of industry test standards to provide precise direction when conducting the test procedure. Proposed revisions to definitions and test

conditions only clarify the test method. Further, the proposed reorganization and alignment of terminology among relevant sections of the CFR improves readability and provides clarity throughout the sampling requirements, test procedure, and applicable energy conservation standards.

DOE is proposing to specify the frequency for testing and whether cathode heat is included in measurements. DOE's proposal reflects the stated direction in industry test standards referenced by the current test procedure and also standard industry practice as verified by product submissions in CCMS. Because DOE is specifying details that are already required or in use, DOE tentatively concludes that there are no costs incurred due to this proposal.

Although DOE notes that it has proposed a test method for measuring the CRI of incandescent lamps and measuring lifetime of incandescent reflector lamps, testing for these metrics is already required by DOE, EISA 2007, or FTC. As such, manufacturers already conduct this test for covered products. The method of measuring CRI has not changed substantively in over 20 years (the referenced industry test standard was last updated in 1995) and therefore the method of measurement used by manufacturers is likely substantively similar to DOE's proposed method. Further, the data required for CRI can be gathered via an integrating sphere at the same time the sphere is used to measure lumen output. Thus, the data to determine CRI can be gathered while measuring a quantity that is used in a metric already reported to DOE (*i.e.*, lamp efficacy). Regarding lifetime, the FTC requires manufacturers to report life (in years) of IRLs on its Lighting Facts label. The lifetime test method used in support of the Lighting Facts label is likely substantively similar to the method proposed by DOE. The industry test method that describes measuring the lifetime of incandescent filament lamps is IES-49. Although IES-49 was updated in 2012, DOE tentatively concluded in section 4 that changes in the updated version are only explicitly stating what is likely already practiced by test labs.

Further, NEMA and LEDVANCE stated that the adoption of the updated standard posed no known issues. (NEMA, No. 7 at pp. 2,4; LEDVANCE, No. 2 at p. 5) Therefore, because industry is already conducting tests for the CRI of incandescent lamps and the lifetime of incandescent reflector lamps and using methods that are substantively similar to the methods in this proposal, DOE concludes that there are no costs incurred due to these proposed test methods.

DOE is proposing to change the minimum sample size to 10 lamps instead of 21 lamps. Because current certifications already must be based on a sample size of more than 10 units, products currently certified to DOE would not have to be retested as a result of this change. However, manufacturers would be able to use the new sampling requirements, if made final, when new products are introduced and certified to DOE. Based on a review of submission dates for GSFL, IRL, and GSIL basic models in DOE's CCMS database, DOE determined the number of new model certifications for 2016-2018, the past three full years of certification. An average of 196 GSFL, 30 IRL, and 84 GSIL new models were certified over these years. The cost to test efficacy, CCT, and CRI at a third party laboratory is \$90 per unit for a GSFL and \$75 per unit for an IRL or GSIL. Based on feedback from laboratories, a reduction in sample size would not change costs for lifetime testing for GSILs. Thus, DOE estimates the annual savings for GSFLs due to reduced sample size requirements to be \$193,710, for IRLs \$24,475 and for GSILs \$69,025.

DOE did not include any administrative cost savings associated with the removal of the requirement that the sample include a minimum of three lamps from each month of production for a minimum of 7 out of the 12-month period. DOE requests comments from stakeholders on the magnitude of savings from such a change, if any.



DOE has also proposed to allow manufacturers to make voluntary representations of certain GSFLs. DOE proposes that manufacturers can voluntarily make representations at the high frequency settings specified in the 2016 versions of ANSI C78.81 and ANSI C78.901 in accordance with test procedures specified in Appendix R and sampling requirements in 10 CFR 429.27. These values would not be used for compliance but rather would be in addition to values obtained for compliance and used for determining if and how standards for GSFLs should be amended to accommodate testing at high frequency settings. While this proposed test method is voluntary and would only be used for representations of efficacy at high frequency reference ballast settings, it is unclear how many manufacturers would use it to make representations. DOE requests comments, data, and information regarding what percent of industry may choose to make representations at these conditions.

DOE has initially determined that the proposed amendments discussed above would not require changes to the designs of GSFLs, IRLs, or GSILs, and that the proposed amendments would not impact the utility of such products or impact the availability of GSFL, IRL, or GSIL products. DOE expects that the proposed amendments would not impact the representations of GSFL, IRL, or GSIL energy efficiency. DOE expects that manufacturers would be able to rely on data generated under the current test procedure should the proposed amendments be finalized. As such, DOE does not expect retesting of GSFLs, IRLs, or GSILs would be required solely as a result of DOE's adoption of the proposed amendments to the test procedure.

DOE requests comment on its understanding of the estimated cost impact and its finding that manufacturers would experience cost savings associated with these proposed amendments.

## 2. Harmonization with Industry Test Standards

DOE's established practice is to adopt relevant industry standards as DOE test procedures unless such methodology would be unduly burdensome to conduct or would not produce test results that reflect the energy efficiency, energy use, water use (as specified in EPCA) or estimated operating costs of that product during a representative average use cycle or period of use. Section 8(c) of appendix A of 10 CFR part 430 subpart C; see also 42 U.S.C. 6293(b)(3). In cases where the industry standard does not meet EPCA statutory criteria for test procedures, DOE will make modifications through the rulemaking process to these standards as the DOE test procedure.

DOE is proposing to update to the latest versions of several industry test standards referenced in Appendix R. For the electrical and photometric measurements of GSFLs DOE is proposing to incorporate by reference IES LM-9-2020, ANSI C78.375A-2014 (R2020), ANSI C82.3-2016, ANSI C78.81-2016 (voluntary representations only) and ANSI C78.901-2016 (voluntary representations only). For the electrical and photometric measurements of IRLs, DOE is proposing to incorporate by reference IES LM-20-2020. For electrical and photometric measurements of GSILs, DOE is proposing to incorporate IES LM-45-2020 and for lifetime measurements of GSILs, IES LM-49-2020. For spectroradiometric measurements of GSFLs, IRLs, and GSILs, DOE is proposing to incorporate IES LM-58-2020. For CCT measurements for GSFLs, IRLs, and GSILs, DOE is proposing to incorporate CIE 15:2018. For seasoning instructions for GSFLs, IRLs, and GSILs, DOE is proposing to incorporate IES LM-54-2020. For integrated sphere measurements for GSILs and GSFLs, DOE is proposing to incorporate IES LM-78-2020. In addition to references to industry test standards, DOE is proposing the following general instructions: The DOE test procedure takes precedence when there are conflicting requirements between it and referenced industry test standards; the same lamp orientation should be maintained throughout testing; and defective lamps should be replaced with new units.

The industry test standards DOE proposes to incorporate by reference via amendments described in this notice are discussed in further detail in section II.B of this NOPR. DOE has tentatively determined that the proposed amendments in this notice are not unduly burdensome to conduct. DOE requests comments on the benefits and burdens of the proposed updates and additions to industry test standards referenced in the test procedure for GSFLs, IRLs, and GSILs.

### I. Compliance Date

EPCA prescribes that all representations of energy efficiency and energy use, including those made on marketing materials and product labels, must be made in accordance with an amended test procedure, beginning 180 days after publication of such a test procedure final rule in the *Federal Register*. (42 U.S.C. 6293(c)(2)) If DOE were to publish amended test procedures, EPCA provides an allowance for individual manufacturers to petition DOE for an extension of the 180-day period if the manufacturer may experience undue hardship in meeting the 180-day deadline. (42 U.S.C. 6293(c)(3)) To receive such an extension, petitions must be filed with DOE no later than 60 days before the end of the 180-day period and must detail how the manufacturer will experience undue hardship. (*Id.*)

## **IV. Procedural Issues and Regulatory Review**

### A. Review Under Executive Order 12866

The Office of Management and Budget (“OMB”) has determined that test procedure rulemakings do not constitute “significant regulatory actions” under section 3(f) of Executive Order 12866, Regulatory Planning and Review, 58 FR 51735 (Oct. 4, 1993). Accordingly, this action was not subject to review under the Executive Order by the Office of Information and Regulatory Affairs (OIRA) in OMB.

## B. Review Under the Regulatory Flexibility Act

The Regulatory Flexibility Act (5 U.S.C. 601 et seq., as amended by the Small Business Regulatory Enforcement Fairness Act of 1996) requires preparation of an initial regulatory flexibility analysis (“IRFA”) for any rule that by law must be proposed for public comment, unless the agency certifies that the rule, if promulgated, will not have a significant economic impact on a substantial number of small entities. A regulatory flexibility analysis examines the impact of the rule on small entities and considers alternative ways of reducing negative effects. Also, as required by Executive Order 13272, “Proper Consideration of Small Entities in Agency Rulemaking,” 67 FR 53461 (August 16, 2002), DOE published procedures and policies on February 19, 2003, to ensure that the potential impacts of its rules on small entities are properly considered during the DOE rulemaking process. 68 FR 7990. DOE has made its procedures and policies available on the Office of the General Counsel’s website:

*<https://www.energy.gov/gc/office-general-counsel>.*

DOE reviewed this proposed rule to amend the test procedures for GSFLs, GSILs, and IRLs under the provisions of the Regulatory Flexibility Act and the procedures and policies published on February 19, 2003. DOE certifies that the proposed rule, if adopted, would not have a significant impact on a substantial number of small entities. The factual basis for this certification is set forth in the following paragraphs.

The Small Business Administration (“SBA”) considers a business entity to be a small business, if, together with its affiliates, it employs less than a threshold number of workers specified in 13 CFR part 121. The size standards and codes are established by the 2017 North American Industry Classification System (“NAICS”).

GSFL, GSIL, and IRL manufacturers are classified under NAICS code 335110, electric lamp bulb and part manufacturing. The SBA sets a threshold of 1,250 employees or fewer for an entity to be considered as a small business for this NAICS code. DOE conducted a focused inquiry into small business manufacturers of products covered by this rulemaking. DOE used DOE's Compliance Certification Database to identify basic models of GSFLs, IRLs, and GSILs. DOE then used other publicly available data sources, such as California Energy Commission's Modernized Appliance Efficiency Database System and company specific product literature, to create a list of companies that import or otherwise manufacture the GSFL, IRL, and GSIL models covered by this rulemaking. Using these sources, DOE identified a total of 20 distinct companies that import or manufacture GSFLs, IRLs, or GSILs in the United States.

DOE then reviewed these companies to determine whether the entities met the SBA's definition of a "small business" as it relates to NAICS code 335110 and screened out any companies that do not offer products covered by this rulemaking, do not meet the definition of a "small business," or are foreign owned and operated. DOE did not identify any small businesses that manufacture GSFLs, IRLs, or GSILs in the United States.

Because DOE identified no small businesses that manufacture GSFLs, IRLs, or GSILs in the United States, DOE tentatively concludes that the impacts of the test procedure amendments proposed in this NOPR would not have a "significant economic impact on a substantial number of small entities," and that the preparation of an IRFA is not warranted. DOE will transmit the certification and supporting statement of factual basis to the Chief Counsel for Advocacy of the Small Business Administration for review under 5 U.S.C. 605(b).

DOE requests comments on its tentative determination that there are no small businesses that manufacture GSFLs, IRLs, and GSILs in the United States.

### C. Review Under the Paperwork Reduction Act of 1995

Manufacturers of GSFLs, IRLs, and GSILs must certify to DOE that their products comply with any applicable energy conservation standards. To certify compliance, manufacturers must first obtain test data for their products according to the DOE test procedures, including any amendments adopted for those test procedures. DOE has established regulations for the certification and recordkeeping requirements for all covered consumer products and commercial equipment, including GSFLs, IRLs, and GSILs. (See generally 10 CFR part 429.) The collection-of-information requirement for the certification and recordkeeping is subject to review and approval by OMB under the Paperwork Reduction Act (“PRA”). This requirement has been approved by OMB under OMB control number 1910-1400. Public reporting burden for the certification is estimated to average 35 hours per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information.

Notwithstanding any other provision of the law, no person is required to respond to, nor shall any person be subject to a penalty for failure to comply with, a collection of information subject to the requirements of the PRA, unless that collection of information displays a currently valid OMB Control Number.

### D. Review Under the National Environmental Policy Act of 1969

DOE is analyzing this proposed regulation in accordance with the National Environmental Policy Act of 1969 (“NEPA”) and DOE’s NEPA implementing regulations (10 CFR part 1021). DOE’s regulations include a categorical exclusion for rulemakings interpreting or amending an existing rule or regulation that does not change the environmental effect of the rule or regulation being amended. 10 CFR part 1021, Subpart D, Appendix A5. DOE

anticipates that this rulemaking qualifies for categorical exclusion A5 because it is an interpretive rulemaking that does not change the environmental effect of the rule and otherwise meets the requirements for application of a categorical exclusion. See 10 CFR 1021.410. DOE will complete its NEPA review before issuing the final rule.

#### E. Review Under Executive Order 13132

Executive Order 13132, “Federalism,” 64 FR 43255 (August 4, 1999) imposes certain requirements on agencies formulating and implementing policies or regulations that preempt State law or that have Federalism implications. The Executive Order requires agencies to examine the constitutional and statutory authority supporting any action that would limit the policymaking discretion of the States and to carefully assess the necessity for such actions. The Executive Order also requires agencies to have an accountable process to ensure meaningful and timely input by State and local officials in the development of regulatory policies that have Federalism implications. On March 14, 2000, DOE published a statement of policy describing the intergovernmental consultation process it will follow in the development of such regulations. 65 FR 13735. DOE has examined this proposed rule and has determined that it would not have a substantial direct effect on the States, on the relationship between the national government and the States, or on the distribution of power and responsibilities among the various levels of government. EPCA governs and prescribes Federal preemption of State regulations as to energy conservation for the products that are the subject of this proposed rule. States can petition DOE for exemption from such preemption to the extent, and based on criteria, set forth in EPCA. (42 U.S.C. 6297(d)) No further action is required by Executive Order 13132.

#### F. Review Under Executive Order 12988

Regarding the review of existing regulations and the promulgation of new regulations, section 3(a) of Executive Order 12988, “Civil Justice Reform,” 61 FR 4729 (Feb. 7, 1996), imposes on Federal agencies the general duty to adhere to the following requirements: (1) eliminate drafting errors and ambiguity, (2) write regulations to minimize litigation, (3) provide a clear legal standard for affected conduct rather than a general standard, and (4) promote simplification and burden reduction. Section 3(b) of Executive Order 12988 specifically requires that Executive agencies make every reasonable effort to ensure that the regulation (1) clearly specifies the preemptive effect, if any, (2) clearly specifies any effect on existing Federal law or regulation, (3) provides a clear legal standard for affected conduct while promoting simplification and burden reduction, (4) specifies the retroactive effect, if any, (5) adequately defines key terms, and (6) addresses other important issues affecting clarity and general draftsmanship under any guidelines issued by the Attorney General. Section 3(c) of Executive Order 12988 requires Executive agencies to review regulations in light of applicable standards in sections 3(a) and 3(b) to determine whether they are met or it is unreasonable to meet one or more of them. DOE has completed the required review and determined that, to the extent permitted by law, the proposed rule meets the relevant standards of Executive Order 12988.

#### G. Review Under the Unfunded Mandates Reform Act of 1995

Title II of the Unfunded Mandates Reform Act of 1995 (“UMRA”) requires each Federal agency to assess the effects of Federal regulatory actions on State, local, and Tribal governments and the private sector. Pub. L. 104-4, sec. 201 (codified at 2 U.S.C. 1531). For a proposed regulatory action likely to result in a rule that may cause the expenditure by State, local, and Tribal governments, in the aggregate, or by the private sector of \$100 million or more in any one year (adjusted annually for inflation), section 202 of UMRA requires a Federal agency to publish a written statement that estimates the resulting costs, benefits, and other effects on the national



economy. (2 U.S.C. 1532(a), (b)) The UMRA also requires a Federal agency to develop an effective process to permit timely input by elected officers of State, local, and Tribal governments on a proposed “significant intergovernmental mandate,” and requires an agency plan for giving notice and opportunity for timely input to potentially affected small governments before establishing any requirements that might significantly or uniquely affect small governments. On March 18, 1997, DOE published a statement of policy on its process for intergovernmental consultation under UMRA. 62 FR 12820; also available at [https://energy.gov/sites/prod/files/gcprod/documents/umra\\_97.pdf](https://energy.gov/sites/prod/files/gcprod/documents/umra_97.pdf). DOE examined this proposed rule according to UMRA and its statement of policy and determined that the rule contains neither an intergovernmental mandate, nor a mandate that may result in the expenditure of \$100 million or more in any year, so these requirements do not apply.

#### H. Review Under the Treasury and General Government Appropriations Act, 1999

Section 654 of the Treasury and General Government Appropriations Act, 1999 (Pub. L. 105-277) requires Federal agencies to issue a Family Policymaking Assessment for any rule that may affect family well-being. This proposed rule would not have any impact on the autonomy or integrity of the family as an institution. Accordingly, DOE has concluded that it is not necessary to prepare a Family Policymaking Assessment.

#### I. Review Under Executive Order 12630

DOE has determined, under Executive Order 12630, “Governmental Actions and Interference with Constitutionally Protected Property Rights” 53 FR 8859 (March 18, 1988), that this regulation would not result in any takings that might require compensation under the Fifth Amendment to the U.S. Constitution.

## J. Review Under Treasury and General Government Appropriations Act, 2001

Section 515 of the Treasury and General Government Appropriations Act, 2001 (44 U.S.C. 3516 note) provides for agencies to review most disseminations of information to the public under guidelines established by each agency pursuant to general guidelines issued by OMB. OMB's guidelines were published at 67 FR 8452 (Feb. 22, 2002), and DOE's guidelines were published at 67 FR 62446 (Oct. 7, 2002). Pursuant to OMB Memorandum M-19-15, Improving Implementation of the Information Quality Act (April 24, 2019), DOE published updated guidelines which are available at

*<https://www.energy.gov/sites/prod/files/2019/12/f70/DOE%20Final%20Updated%20IQA%20Guidelines%20Dec%202019.pdf>*. DOE has reviewed this proposed rule under the OMB and DOE guidelines and has concluded that it is consistent with applicable policies in those guidelines.

## K. Review Under Executive Order 13211

Executive Order 13211, "Actions Concerning Regulations That Significantly Affect Energy Supply, Distribution, or Use," 66 FR 28355 (May 22, 2001), requires Federal agencies to prepare and submit to OMB, a Statement of Energy Effects for any proposed significant energy action. A "significant energy action" is defined as any action by an agency that promulgated or is expected to lead to promulgation of a final rule, and that (1) is a significant regulatory action under Executive Order 12866, or any successor order; and (2) is likely to have a significant adverse effect on the supply, distribution, or use of energy; or (3) is designated by the Administrator of OIRA as a significant energy action. For any proposed significant energy action, the agency must give a detailed statement of any adverse effects on energy supply, distribution, or use should the proposal be implemented, and of reasonable alternatives to the action and their expected benefits on energy supply, distribution, and use.

The proposed regulatory action to amend the test procedure for measuring the energy efficiency of GSFLs, IRLs, and GSILs is not a significant regulatory action under Executive Order 12866. Moreover, it would not have a significant adverse effect on the supply, distribution, or use of energy, nor has it been designated as a significant energy action by the Administrator of OIRA. Therefore, it is not a significant energy action, and, accordingly, DOE has not prepared a Statement of Energy Effects.

#### L. Review Under Section 32 of the Federal Energy Administration Act of 1974

Under section 301 of the Department of Energy Organization Act (Pub. L. 95–91; 42 U.S.C. 7101), DOE must comply with section 32 of the Federal Energy Administration Act of 1974, as amended by the Federal Energy Administration Authorization Act of 1977. (15 U.S.C. 788; FEAA) Section 32 essentially provides in relevant part that, where a proposed rule authorizes or requires use of commercial standards, the notice of proposed rulemaking must inform the public of the use and background of such standards. In addition, section 32(c) requires DOE to consult with the Attorney General and the FTC concerning the impact of the commercial or industry test standards on competition.

The modifications to the test procedure for GSFLs, IRLs, and GSILs proposed in this document incorporate the following industry standards:

- 1) ANSI Standard C78.21, “American National Standard for Electric Lamps - PAR and R Shapes,” 2011 (R2016);
- 2) ANSI Standard C78.79, “American National Standard for Electric Lamps - Nomenclature for Envelope Shapes Intended for Use with Electric Lamps,” 2014 (R2020);
- 3) ANSI C78.375A, “American National Standard for Electric Lamps - Fluorescent Lamps – Guide for Electrical Measures,” 2014 (R2020);

- 4) ANSI Standard C78.81, “American National Standard for Electric Lamps – Double-Capped Fluorescent Lamps – Dimensional and Electrical Characteristics,” 2016;
- 5) ANSI Standard C78.901, “American National Standard for Electric Lamps – Single-Based Fluorescent Lamps – Dimensional and Electrical Characteristics,” 2016;
- 6) ANSI\_ ANSLG C81.61, “American National Standard for electrical lamp bases— Specifications for Bases (Caps) for Electric Lamps,” 2006;
- 7) ANSI C82.3, “American National Standard for Lamp Ballasts – Reference Ballasts for Fluorescent Lamps,” 2016;
- 8) IES Test Method LM-9, “ANSI/IES LM-9-2020—Approved Method: Electrical and Photometric Measurements of Fluorescent Lamps,” 2020;
- 9) IES LM-20, “ANSI/IES LM-20-20 Approved Method: Photometry of Reflector Type Lamps,” 2020;
- 10) IES LM-45, “ANSI/IES LM-45-20 Approved Method: Electrical and Photometric Measurement of General Service Incandescent Filament Lamps,” 2020;
- 11) IES LM-49, “ANSI/IES LM-49-20 Approved Method: Life Testing of Incandescent Filament Lamps,” 2020;
- 12) IES Test Method LM-54, “ANSI/IES LM-54-20 Approved Method: IES Guide to Lamp Seasoning,” 2020;
- 13) IES LM-58, “ANSI/IES LM-58-20 Approved Method: Spectroradiometric Measurements Methods for Lighting Sources,” 2020;
- 14) IESNA LM-78, “ANSI/IES LM-78-20 Approved Method: Total Luminous Flux Measurement of Lamps Using an Integrating Sphere Photometer,” 2020; and
- 15) CIE 15:2018, “Colorimetry, 4<sup>th</sup> Edition,” 2018.

DOE has evaluated these standards and is unable to conclude whether they fully comply with the requirements of section 32(b) of the FEAA (*i.e.*, whether they were developed in a

manner that fully provides for public participation, comment, and review.) DOE will consult with both the Attorney General and the Chairman of the FTC concerning the impact of these test procedures on competition, prior to prescribing a final rule.

#### M. Description of Materials Incorporated by Reference

In this NOPR, DOE proposes to incorporate by reference the test standard published by ANSI, titled “ANSI C78.21-2011 (R2016) Revision of ANSI C78.21-2011, American National Standard for Incandescent Lamps—PAR and R Shapes,” ANSI Standard ANSI C78.21-2011 (R2016). ANSI C78.21-2011 (R2016) is an industry accepted test standard that provides physical and electrical characteristics of the group of incandescent lamps that have PAR and R bulb shapes. The test procedure proposed in this NOPR references sections of ANSI C78.21-2011 (R2016) for definitions of incandescent reflector lamps. ANSI C78.21-2011 (R2016) is readily available on ANSI’s website at <https://webstore.ansi.org/>.

In this NOPR, DOE proposes to incorporate by reference the test standard published by ANSI, titled “ANSI C78.79-2014 (R2020) Revision of ANSI C78.79-2014, American National Standard for Electric Lamps—Nomenclature for Envelope Shapes Intended for Use with Electric Lamps,” ANSI Standard ANSI C78.79-2014 (R2020). ANSI C78.79-2014 (R2020) is an industry accepted test standard that describes a system of nomenclature that provides designations for envelope shapes used for all electric lamps. The test procedure proposed in this NOPR references sections of ANSI C78.79-2014 (R2020) for definitions of incandescent reflector lamps. ANSI C78.79-2014 (R2020) is readily available on ANSI’s website at <https://webstore.ansi.org/>.

In this NOPR, DOE proposes to incorporate by reference the test standard published by ANSI, titled “ANSI\_ ANSLG C81.61-2006, Revision of ANSI C81.61-2005, American National

Standard for electric lamp bases – Specifications for Bases (Caps) for Electric Lamps,” ANSI Standard C81.61-2006. ANSI C81.61-2006 is an industry accepted standard that sets forth the specification for bases (caps) used on electric lamps. The standard is currently used to specify GSILs with certain bases that are not subject to standards in 10 CFR 430.32. In this NOPR ANSI C81.61-2006 is being approved for use in 10 CFR 430.32. ANSI C81.61-2006 is readily available on ANSI’s website at <https://webstore.ansi.org/>.

In this NOPR, DOE proposes to incorporate by reference the test standard published by ANSI, titled “ANSI C78.375A-2014 (R2020) Revision of ANSI C78.375-2014, American National Standard for Electric Lamps-Fluorescent Lamps-Guide for Electrical Measures,” ANSI Standard C78.375A-2014 (R2020). ANSI C78.375A-2014 (R2020) is an industry accepted test standard that describes procedures for measuring the electrical characteristics of fluorescent lamps. The test procedure proposed in this NOPR references sections of ANSI C78.375A-2014 (R2020) for voltage and current conditions when testing performance of fluorescent lamps. ANSI C78.375A-2014 (R2020) is readily available on ANSI’s website at <https://webstore.ansi.org/>.

In this NOPR, DOE proposes to incorporate by reference the test standard published by ANSI, titled “American National Standard for Lamp Ballasts – Reference Ballasts for Fluorescent Lamps,” ANSI Standard C82.3-2016. ANSI C82.3 is an industry accepted standard that describes characteristics and requirements of fluorescent lamp reference ballasts. The test procedure proposed in this NOPR references ANSI C82.3 for setting up the reference circuit when testing the performance of fluorescent lamps. ANSI C82.3 is readily available on ANSI’s website at <https://webstore.ansi.org/>.

In this NOPR, DOE proposes to incorporate by reference the test standard published by ANSI, titled “American National Standard for Electric Lamps – Double-Capped Fluorescent Lamps – Dimensional and Electrical Characteristics,” ANSI Standard C78.81-2016. ANSI C78.81 is an industry accepted standard that provides electrical characteristics for double base fluorescent lamps and reference ballasts. The test procedure proposed in this NOPR references ANSI C78.81 for reference ballast settings to test the performance of fluorescent lamps using high frequency reference ballast settings for making voluntary representations to DOE. ANSI C78.81 is readily available on ANSI’s website at <https://webstore.ansi.org/>.

In this NOPR, DOE proposes to incorporate by reference the test standard published by ANSI, titled “American National Standard for Electric Lamps – Single-Based Fluorescent Lamps – Dimensional and Electrical Characteristics,” ANSI Standard C78.901-2016. ANSI C78.901 is an industry accepted standard that provides electrical characteristics for single base fluorescent lamps and reference ballasts. The test procedure proposed in this NOPR references ANSI C78.901 for reference ballast settings to test the performance of fluorescent lamps using high frequency reference ballast settings for making voluntary representations to DOE. ANSI C78.901 is readily available on ANSI’s website at <https://webstore.ansi.org/>.

In this NOPR, DOE proposes to incorporate by reference the test method published by IES, titled “ANSI/IES LM-9-2020—Approved Method: Electrical and Photometric Measurements of Fluorescent Lamps,” IES Test Method LM-9. IES LM-9 is an industry accepted standard that describes methods for taking electrical and photometric measurements of fluorescent lamps. The test procedure proposed in this NOPR references IES LM-9 for testing the performance of general service fluorescent lamps. IES LM-9 is readily available on IES’s website at <https://www.ies.org/store>.

In this NOPR, DOE proposes to incorporate by reference the test method published by IES, titled “ANSI/IES LM-20-20 Approved Method: Photometry of Reflector Type Lamps,” IES Test Method LM-20. IES LM-20 is an industry accepted standard that describes methods for taking electrical and photometric measurements of reflector lamps. The test procedure proposed in this NOPR references IES LM-20 for testing the performance of incandescent reflector lamps. IES LM-20 is readily available on IES’s website at <https://www.ies.org/store>.

In this NOPR, DOE proposes to incorporate by reference the test method published by IES, titled “Approved Method: Electrical and Photometric Measurement of General Service Incandescent Filament Lamps,” IES Test Method LM-45-2020. IES LM-45 is an industry accepted standard that describes methods for taking electrical and photometric measurements of general service incandescent filament lamps. The test procedure proposed in this NOPR references IES LM-45 for testing the performance of incandescent lamps. IES LM-45 is readily available on IES’s website at <https://www.ies.org/store>.

In this NOPR, DOE proposes to incorporate by reference the test method published by IES, titled “ANSI/IES LM-49-20 Approved Method: Life Testing of Incandescent Filament Lamps,” IES Test Method LM-49. IES LM-49 is an industry accepted standard that describes the method for determining the lifetime of an incandescent filament lamp. The test procedure proposed in this NOPR references IES LM-49 for testing the lifetime of incandescent lamps. IES LM-49 is readily available on IES’s website at <https://www.ies.org/store>.

In this NOPR, DOE proposes to incorporate by reference the test method published by IES, titled “ANSI/IES LM-58-20 Approved Method: Spectroradiometric Measurements Methods for Lighting Sources,” IES Test Method LM-58. IES LM-58 is an industry accepted standard that describes methods for taking spectroradiometric measurements for light sources. The test



procedure proposed in this NOPR references IES LM-58 for determining the CRI and CCT of fluorescent lamps and incandescent lamps and CRI of incandescent reflector lamps. IES LM-58 is readily available on IES's website at <https://www.ies.org/store>.

In this NOPR, DOE proposes to incorporate by reference the test method published by IESNA, titled "ANSI/IES LM-78-20 Approved Method: Total Luminous Flux Measurement of Lamps Using an Integrating Sphere Photometer," IES Test Method LM-78. IES LM-78 is an industry accepted test standard that specifies a method for measuring lumen output in an integrating sphere. The test procedure proposed in this NOPR references IES LM-20 for testing the performance of incandescent reflector lamps, which in turn references IES LM-78 for integrating sphere photometer calibration and measurements. IES LM-78 is readily available on IES's website at <https://www.ies.org/store>.

In this NOPR, DOE proposes to incorporate by reference the test method published by IES, titled "ANSI/IES LM-54-20 Approved Method: IES Guide to Lamp Seasoning," IES Test Method LM-54. IES LM-54 is an industry accepted test standard that specifies a method for seasoning lamps. The test procedure proposed in this NOPR references IES LM-9, IES LM-20, and IES LM-45 for testing the performance of respectively, GSFLs, IRLs, and GSILs, which in turn references IES LM-54 for seasoning lamps. IES LM-54 is readily available on IES's website at <https://www.ies.org/store>.

In this NOPR, DOE proposes to incorporate by reference the test method published by CIE, titled "Colorimetry, 4th edition," CIE 15:2018. CIE 15:2018 is an industry accepted test standard that specifies methods for taking color measurements. The test procedure proposed in this NOPR references CIE 15:2018 for testing CCT. CIE 15:2018 is readily available on CIE's website at <https://cie.co.at/publications>.

In this NOPR, DOE included proposed revisions to the regulatory text of § 430.32 that contained a reference to ANSI C78.3. That standard was previously approved for incorporation by reference; no changes are proposed.

## **V. Public Participation**

### A. Participation in the Webinar

The time and date of the webinar are listed in the **DATES** section at the beginning of this document. If no participants register for the webinar then it will be cancelled. Webinar registration information, participant instructions, and information about the capabilities available to webinar participants will be published on DOE's website:

*[https://www1.eere.energy.gov/buildings/appliance\\_standards/standards.aspx?productid=22](https://www1.eere.energy.gov/buildings/appliance_standards/standards.aspx?productid=22).*

Participants are responsible for ensuring their systems are compatible with the webinar software.

### B. Procedure for Submitting Prepared General Statements for Distribution

Any person who has an interest in the topics addressed in this notice, or who is representative of a group or class of persons that has an interest in these issues, may request an opportunity to make an oral presentation at the webinar. Such persons may submit to *ApplianceStandardsQuestions@ee.doe.gov*. Persons who wish to speak should include with their request a computer file in WordPerfect, Microsoft Word, PDF, or text (ASCII) file format that briefly describes the nature of their interest in this rulemaking and the topics they wish to discuss. Such persons should also provide a daytime telephone number where they can be reached.

### C. Conduct of the Webinar

DOE will designate a DOE official to preside at the webinar/public meeting and may also use a professional facilitator to aid discussion. The meeting will not be a judicial or evidentiary-type public hearing, but DOE will conduct it in accordance with section 336 of EPCA (42 U.S.C. 6306). A court reporter will be present to record the proceedings and prepare a transcript. DOE reserves the right to schedule the order of presentations and to establish the procedures governing the conduct of the webinar/public meeting. There shall not be discussion of proprietary information, costs or prices, market share, or other commercial matters regulated by U.S. anti-trust laws. After the webinar/public meeting and until the end of the comment period, interested parties may submit further comments on the proceedings and any aspect of the rulemaking.

The webinar/public meeting will be conducted in an informal, conference style. DOE will present summaries of comments received before the webinar/public meeting, allow time for prepared general statements by participants, and encourage all interested parties to share their views on issues affecting this rulemaking. Each participant will be allowed to make a general statement (within time limits determined by DOE), before the discussion of specific topics. DOE will permit, as time permits, other participants to comment briefly on any general statements.

At the end of all prepared statements on a topic, DOE will permit participants to clarify their statements briefly. Participants should be prepared to answer questions by DOE and by other participants concerning these issues. DOE representatives may also ask questions of participants concerning other matters relevant to this rulemaking. The official conducting the webinar/public meeting will accept additional comments or questions from those attending, as time permits. The presiding official will announce any further procedural rules or modification

of the above procedures that may be needed for the proper conduct of the webinar/public meeting.

A transcript of the webinar/public meeting will be included in the docket, which can be viewed as described in the *Docket* section at the beginning of this notice. In addition, any person may buy a copy of the transcript from the transcribing reporter.

#### D. Submission of Comments

DOE will accept comments, data, and information regarding this proposed rule no later than the date provided in the **DATES** section at the beginning of this proposed rule. Interested parties may submit comments using any of the methods described in the **ADDRESSES** section at the beginning of this proposed rule.

*Submitting comments via <https://www.regulations.gov>.* The <https://www.regulations.gov> web page will require you to provide your name and contact information. Your contact information will be viewable to DOE Building Technologies staff only. Your contact information will not be publicly viewable except for your first and last names, organization name (if any), and submitter representative name (if any). If your comment is not processed properly because of technical difficulties, DOE will use this information to contact you. If DOE cannot read your comment due to technical difficulties and cannot contact you for clarification, DOE may not be able to consider your comment.

However, your contact information will be publicly viewable if you include it in the comment or in any documents attached to your comment. Any information that you do not want to be publicly viewable should not be included in your comment, nor in any document attached

to your comment. Persons viewing comments will see only first and last names, organization names, correspondence containing comments, and any documents submitted with the comments.

Do not submit to <https://www.regulations.gov> information for which disclosure is restricted by statute, such as trade secrets and commercial or financial information (hereinafter referred to as Confidential Business Information (“CBI”). Comments submitted through <https://www.regulations.gov> cannot be claimed as CBI. Comments received through the website will waive any CBI claims for the information submitted. For information on submitting CBI, see the Confidential Business Information section.

DOE processes submissions made through <https://www.regulations.gov> before posting. Normally, comments will be posted within a few days of being submitted. However, if large volumes of comments are being processed simultaneously, your comment may not be viewable for up to several weeks. Please keep the comment tracking number that <https://www.regulations.gov> provides after you have successfully uploaded your comment.

*Submitting comments via email.* Comments and documents submitted via email also will be posted to <https://www.regulations.gov>. If you do not want your personal contact information to be publicly viewable, do not include it in your comment or any accompanying documents. Instead, provide your contact information on a cover letter. Include your first and last names, email address, telephone number, and optional mailing address. The cover letter will not be publicly viewable as long as it does not include any comments.

Include contact information each time you submit comments, data, documents, and other information to DOE.

Comments, data, and other information submitted to DOE electronically should be provided in PDF (preferred), Microsoft Word or Excel, WordPerfect, or text (ASCII) file format. Provide documents that are not secured, written in English and free of any defects or viruses. Documents should not contain special characters or any form of encryption and, if possible, they should carry the electronic signature of the author.

*Campaign form letters.* Please submit campaign form letters by the originating organization in batches of between 50 to 500 form letters per PDF or as one form letter with a list of supporters' names compiled into one or more PDFs. This reduces comment processing and posting time.

*Confidential Business Information.* According to 10 CFR 1004.11, any person submitting information that he or she believes to be confidential and exempt by law from public disclosure should submit via email two well-marked copies: one copy of the document marked confidential including all the information believed to be confidential, and one copy of the document marked non-confidential with the information believed to be confidential deleted. DOE will make its own determination about the confidential status of the information and treat it according to its determination.

It is DOE's policy that all comments may be included in the public docket, without change and as received, including any personal information provided in the comments (except information deemed to be exempt from public disclosure).

#### E. Issues on Which DOE Seeks Comment

Although DOE welcomes comments on any aspect of this proposal, DOE is particularly interested in receiving comments and views of interested parties concerning the following issues:

- 1) DOE requests comments on its proposal to incorporate by reference the latest versions of ANSI C78.375, ANSI C82.3, IES LM-58, IES-LM-9, IES LM-45, IES LM-49, IES LM-20, IES LM-54, and IES LM-78, and CIE 15 for Appendix R. See section III.B.
- 2) DOE requests comments on its proposal to maintain the currently referenced 2010 versions of ANSI C78.81 and ANSI C78.901 for purposes of demonstrating compliance with standards. DOE also requests comments on its proposal to allow manufacturers to make voluntary representations of certain GSFLs in accordance with the 2016 versions of ANSI C78.81 and ANSI C78.901. See section 1.
- 3) DOE seeks comments on the usefulness of the proposed general clarifications regarding the frequency of operation and inclusion of cathode power and any associated impacts on test burden. DOE also seeks comments on whether the proposed changes are perceived as affecting the compliance of an existing product.
- 4) DOE requests comment on its proposed definitions for “time to failure,” “initial lamp efficacy,” “initial lumen output,” “initial input power,” and updates to definitions of IRL lamp shapes and removal of definitions for “CCT,” “CRI,” “ANSI Standard,” “CIE,” and “IESNA.” See section 1.
- 5) DOE requests comments on its proposed general instructions regarding conflicting requirements, lamp orientation, and lamp breakage. See section 2.
- 6) DOE requests comments on its proposed section references in IES LM-9, IES LM-20, and IES LM-45 for establishing ambient, physical, and electrical conditions; and seasoning and stabilization. See section III.C.a.
- 7) DOE requests comments on its proposed industry test standard references for measuring CCT and CRI. See section III.C.b.
- 8) DOE requests comments on its proposed section references in IES LM-49 for establishing ambient, physical, and electrical conditions and measuring time to

- failure; and its proposed section references in IES LM-45 for seasoning and stabilization. See section 4.
- 9) DOE requests comments on its proposed rounding requirements for initial input power, initial lumen output, CRI, CCT, and lifetime. See section 4.
  - 10) DOE requests comment on its tentative determination that its proposed updates for GSFLs, IRLs, and GSILs will not increase test burden because determining these values to ascertain compliance with applicable DOE standards or FTC labeling requirements is already required by regulation and/or statute.
  - 11) DOE requests comments on its proposed changes in 10 CFR 430.32 to align terminology with test procedures for GSFLs, IRLs, and GSILs. See section III.D
  - 12) DOE seeks comment on its proposal to base the 95 percent upper confidence limit determination for input power on the one-tail rather than the two-tail confidence interval. See section III.D
  - 13) DOE requests comments on replacing “rated lumen output” and “rated lifetime” with respectively, “initial lumen output” and “lifetime.” See section III.D.
  - 14) DOE requests comments on its proposed modifications to definitions for “lifetime” and “rated wattage.” See section III.D.
  - 15) DOE requests comments on its proposal to reduce the minimum sample size from 21 to 10 and remove the requirement that a minimum of three lamps be selected from each month of production for a minimum of 7 months out of a 12-month period. See section III.D
  - 16) DOE requests comments on its proposal to remove initial certification report submissions for GSFLs and IRLs. See section II.D.
  - 17) DOE requests comments from stakeholders on the magnitude of cost savings, if any, from removing the requirement that the sample include a minimum of three lamps



- from each month of production for a minimum of 7 out of the 12-month period. See section III.H.
- 18) DOE requests comments, data, and information regarding what percent of industry may choose to make representations using high frequency ballast settings. See section III.H.
- 19) DOE requests comment on its understanding of the estimated impact and its finding that manufacturers would experience cost savings associated with these proposed amendments. See section III.H.
- 20) DOE requests comments on its tentative determination that there are no small businesses that manufacture GSFLs, IRLs, and GSILs in the United States. See section IV.B.

## **VI. Approval of the Office of the Secretary**

The Secretary of Energy has approved publication of this proposed rule.

### **List of Subjects**

#### **10 CFR Part 429**

Administrative practice and procedure, Confidential business information, Energy conservation, Household appliances, Incorporation by reference, Reporting and recordkeeping requirements.

#### **10 CFR Part 430**

Administrative practice and procedure, Confidential business information, Energy conservation, Household appliances, Imports, Incorporation by reference, Intergovernmental relations, Small businesses.

**Signing Authority**

This document of the Department of Energy was signed on May 5, 2021, by Kelly Speakes-Backman, Principal Deputy Assistant Secretary and Acting Assistant Secretary for Energy Efficiency and Renewable Energy, pursuant to delegated authority from the Secretary of Energy. That document with the original signature and date is maintained by DOE. For administrative purposes only, and in compliance with requirements of the Office of the Federal Register, the undersigned DOE Federal Register Liaison Officer has been authorized to sign and submit the document in electronic format for publication, as an official document of the Department of Energy. This administrative process in no way alters the legal effect of this document upon publication in the *Federal Register*.

Signed in Washington, DC, on May 7, 2021

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Treena V. Garrett  
Federal Register Liaison Officer,  
U.S. Department of Energy

For the reasons stated in the preamble, DOE is proposing to amend parts 429 and 430 of Chapter II of Title 10, Code of Federal Regulations as set forth below:

**PART 429--CERTIFICATION, COMPLIANCE, AND ENFORCEMENT FOR  
CONSUMER PRODUCTS AND COMMERCIAL AND INDUSTRIAL EQUIPMENT**

1. The authority citation for part 429 continues to read as follows:

**Authority:** 42 U.S.C. 6291-6317; 28 U.S.C. 2461 note.

**§429.11 [Amended]**

2. Amend § 429.11 by:

- a. Removing, “429.62” and adding in its place “429.66” in paragraph (a); and
- b. Removing, “429.65” and adding in its place “429.66” in paragraph (b)(1).

**§429.12 [Amended]**

3. Amend § 429.12 by:

- a. Removing paragraph (e)(2); and
- b. Redesignating paragraph (e)(3) as (e)(2).

4. Revise § 429.27 to read as follows:

**§429.27 General service incandescent lamps.**

(a) *Determination of Represented Value.* Manufacturers must determine represented values, which include certified ratings, for each basic model by testing in accordance with the following sampling provisions.

(1) Units to be tested. (i) When testing, use a sample comprised of production units. The same sample of units must be tested and used as the basis for representations for initial lumen output, rated wattage, color rendering index (CRI), correlated color temperature (CCT), and lifetime.

(ii) For each basic model, randomly select and test a sample of sufficient size, but not less than 10 units, to ensure that—

(A) Represented values of initial lumen output and CRI are less than or equal to the lower of:

(1) The arithmetic mean of the sample:

Or,

(2) The lower 95 percent confidence limit (LCL) of the true mean divided by .97, where:

$$LCL = \bar{x} - t_{.95} \left( \frac{s}{\sqrt{n}} \right)$$

And  $\bar{x}$  is the sample mean; s is the sample standard deviation; n is the number of samples; and  $t_{.95}$  is the t statistic for a 95% one-tailed confidence interval with n-1 degrees of freedom (from Appendix A).

(B) Represented values of rated wattage are greater than or equal to the higher of:

(1) The arithmetic mean of the sample:

Or,

(2) The upper 95 percent confidence limit (UCL) of the true mean divided by 1.03, where:

$$UCL = \bar{x} + t_{.95} \left( \frac{s}{\sqrt{n}} \right)$$

and  $\bar{x}$  is the sample mean; s is the sample standard deviation; n is the number of samples; and  $t_{.95}$  is the t statistic for a 95% one-tailed confidence interval with n-1 degrees of freedom (from Appendix A to this subpart).

(2) Any represented values of measures of energy efficiency or energy consumption for all individual models represented by a given basic model must be the same.

(3) Represented values of CCT must be equal to the arithmetic mean of the sample.

(4) Represented values of lifetime must be equal to or less than the median time to failure of the sample (calculated as the arithmetic mean of the time to failure of the two middle sample units (or the value of the middle sample unit if there are an odd number of units) when the measured values are sorted in value order).

(5) Calculate represented values of life (in years) by dividing the represented lifetime of these lamps as determined in paragraph (a)(4) of this section by the estimated annual operating hours as specified in 16 CFR 305.23(b)(3)(iii).

(6) Represented values of the estimated annual energy cost, expressed in dollars per year, must be the product of the rated wattage in kilowatts, an electricity cost rate as specified in 16 CFR 305.23(b)(1)(ii), and an estimated average annual use as specified in 16 CFR 305.23(b)(1)(ii).

(b) *Certification reports.* (1) The requirements of §429.12 apply to general service incandescent lamps; and

(2) Pursuant to §429.12(b)(13), a certification report shall include the following public product-specific information: The testing laboratory's ILAC accreditation body's identification number or other approved identification assigned by the ILAC accreditation body, rated wattage in watts (W), the lifetime in hours, and CRI.

(c) *Rounding Requirements.*

- (1) Round rated wattage to the nearest tenth of a watt.
- (2) Round initial lumen output to three significant digits.
- (3) Round CCT to the nearest 100 kelvin (K).
- (4) Round CRI to the nearest whole number.
- (5) Round lifetime to the nearest whole hour.
- (6) Round life (in years) to the nearest tenth.
- (7) Round annual energy cost to the nearest cent.

### **§429.33 [Amended]**

5. Amend §429.33 by:

- a. Removing paragraph (a)(2); and
- b. Redesignating paragraph (a)(3) as (a)(2).
- c. Removing “§429.27” in newly redesignated paragraph (a)(2)(i)(B), and adding “§429.66” in its place; and
- d. Removing “§429.27” in newly redesignated paragraph (a)(2)(i)(C), and adding “§429.27, §429.38, or §429.40, as applicable,” in its place.

6. Add §429.38 to read as follows:

### **§429.38 Incandescent reflector lamps.**

(a) *Determination of Represented Value.* Manufacturers must determine represented values, which include the certified ratings, for each basic model, in accordance with the following sampling provisions.

(1) Units to be tested. (i) When testing, use a sample comprised of production units. The same sample of units must be tested and used as the basis for representations for initial lumen output, rated wattage, lamp efficacy, color rendering index (CRI), lifetime, and correlated color temperature (CCT).

(ii) For each basic model, randomly select and test a sample of sufficient size, but not less than 10 units, to ensure that represented values of average lamp efficacy, CRI, and initial lumen output are less than or equal to the lower of:

(A) The arithmetic mean of the sample;

Or,

(B) The lower 95 percent confidence limit (LCL) of the true mean divided by .97, where:

$$LCL = \bar{x} - t_{.95} \left( \frac{s}{\sqrt{n}} \right)$$

And  $\bar{x}$  is the sample mean; s is the sample standard deviation; n is the number of samples; and  $t_{0.95}$  is the t statistic for a 95% one-tailed confidence interval with n-1 degrees of freedom (from Appendix A).

(2) Any represented values of measures of energy efficiency or energy consumption for all individual models represented by a given basic model must be the same.

(3) Represented values of CCT and rated wattage must be equal to the arithmetic mean of the sample.

(4) Represented values of lifetime must be equal to or less than the median time to failure of the sample (calculated as the arithmetic mean of the time to failure of the two middle sample units (or the value of the middle sample unit if there are an odd number of units) when the measured values are sorted in value order).

(5) Calculate represented values of life (in years) by dividing the represented lifetime of these lamps as determined in paragraph (a)(4) of this section by the estimated annual operating hours as specified in 16 CFR 305.23(b)(3)(iii).

(6) Represented values of the estimated annual energy cost, expressed in dollars per year, must be the product of the rated wattage in kilowatts, an electricity cost rate as specified in 16 CFR 305.23(b)(1)(ii), and an estimated average annual use as specified in 16 CFR 305.23(b)(1)(ii).

(b) *Certification reports.* (1) The requirements of §429.12 apply to incandescent reflector lamps; and

(2) Pursuant to §429.12(b)(13), a certification report shall include the following public product-specific information: The testing laboratory's ILAC accreditation body's identification number or other approved identification assigned by the ILAC accreditation body, average lamp efficacy in lumens per watt (lm/W), and rated wattage in watts (W).

(c) *Rounding Requirements.*

(1) Round rated wattage to the nearest tenth of a watt.

- (2) Round initial lumen output to three significant digits.
- (3) Round average lamp efficacy to the nearest tenth of a lumen per watt.
- (4) Round CCT to the nearest 100 kelvin (K).
- (5) Round CRI to the nearest whole number.
- (6) Round lifetime to the nearest whole hour.
- (7) Round life (in years) to the nearest tenth.
- (8) Round annual energy cost to the nearest cent.

7. Add § 429.66 to read as follows:

**§429.66 General service fluorescent lamps.**

(a) *Determination of Represented Value.* Manufacturers must determine represented values, which include certified ratings, for each basic model by testing, in accordance with the following sampling provisions.

(1) Units to be tested. (i) When testing, use a sample comprised of production units. The same sample of units must be tested and used as the basis for representations for rated wattage, average lamp efficacy, color rendering index (CRI), and correlated color temperature (CCT).

(ii) For each basic model, randomly select and test a sample of sufficient size, but not less than 10 units, to ensure that represented values of average lamp efficacy are less than or equal to the lower of:

(A) The arithmetic mean of the sample:

Or,

(B) The lower 95 percent confidence limit (LCL) of the true mean divided by .97, where:

$$LCL = \bar{x} - t_{.95} \left( \frac{s}{\sqrt{n}} \right)$$

And  $\bar{x}$  is the sample mean; s is the sample standard deviation; n is the number of samples; and  $t_{0.95}$  is the t statistic for a 95% one-tailed confidence interval with n-1 degrees of freedom (from Appendix A).



(2) Any represented values of measures of energy efficiency or energy consumption for all individual models represented by a given basic model must be the same.

(3) Represented values of CCT, CRI and rated wattage must be equal to the arithmetic mean of the sample.

(b) *Certification reports.* (1) The requirements of §429.12 apply to general service fluorescent lamps; and

(2) Pursuant to §429.12(b)(13), a certification report shall include the following public product-specific information: The testing laboratory's ILAC accreditation body's identification number or other approved identification assigned by the ILAC accreditation body, average lamp efficacy in lumens per watt (lm/W), rated wattage in watts (W), CCT in Kelvin (K), and CRI.

(c) *Rounding Requirements.*

(1) Round rated wattage to the nearest tenth of a watt.

(2) Round average lamp efficacy to the nearest tenth of a lumen per watt.

(3) Round CCT to the nearest 100 kelvin (K).

(4) Round CRI to the nearest whole number.

#### **§429.102 [Amended]**

8. Amend § 429.102 by removing “429.62” and adding in its place “429.66” in paragraph (a)(1).

#### **PART 430--ENERGY CONSERVATION PROGRAM FOR CONSUMER PRODUCTS**

9. The authority citation for part 430 continues to read as follows:

**Authority:** 42 U.S.C.6291–6309; 28 U.S.C. 2461 note.

10. Amend § 430.2 by:

- a. Revising the definition of “Basic model” introductory paragraph (1);
- b. Revising the definitions of “BPAR incandescent reflector lamp,” “BR incandescent reflector lamp,” “ER incandescent reflector lamp,” and “R20 incandescent reflector lamp”;
- c. Adding in alphabetical order the definitions of “Lifetime,” “PAR incandescent reflector lamp,” and “R incandescent reflector lamp;”
- d. Removing the definition of “Rated lifetime for general service incandescent lamps”; and
- e. Revising the definition of “Rated wattage”, paragraphs (1)(iii) and (2), and adding paragraph (3).

The additions and revisions read as follows:

#### **§430.2 Definitions.**

\* \* \* \* \*

*Basic model* \* \* \*

(1) With respect to general service fluorescent lamps, general service incandescent lamps, and incandescent reflector lamps: Lamps that have essentially identical light output and electrical characteristics—including lamp efficacy and color rendering index (CRI).

\* \* \* \* \*

*BPAR incandescent reflector lamp* means a reflector lamp as shown in figure C78.21-278 on page 28 of ANSI C78.21-2011 (R2016) (incorporated by reference; *see* §430.3).

*BR incandescent reflector lamp* means a reflector lamp that has a bulged section below the bulb's major diameter and above its approximate base line as shown in Figure 1 (RB) on page 6 of ANSI C78.79-2014 (R2020). A BR30 lamp has a lamp wattage of 85 or less than 66 and a BR40 lamp has a lamp wattage of 120 or less.

\* \* \* \* \*

*ER incandescent reflector lamp* means a reflector lamp that has an elliptical section below the major diameter of the bulb and above the approximate baseline of the bulb, as shown in Figure 1 (RE) on page 6 of ANSI C78.79-2014 (R2020) (incorporated by reference; see §430.3) and product space drawings shown in ANSI C78.21-2011 (R2016) (incorporated by reference; see §430.3).

\* \* \* \* \*

*Lifetime* with respect to an incandescent lamp means the length of operating time between first use and failure of 50 percent of the sample units (as specified in 10 CFR 429.27 and 429.38 of this chapter), determined in accordance with the test procedures described in appendix R to subpart B of this part.

\* \* \* \* \*

*PAR incandescent reflector lamp* means a reflector lamp formed by the sealing together during the lamp-making process of a pressed glass parabolic section and a pressed lens section as shown in Figure 1 (PAR) on page 5 of ANSI C78.79-2014 (R2020), (incorporated by reference; see §430.3). The pressed lens section may be either plain or configured.

\* \* \* \* \*

*R incandescent reflector lamp* means a reflector lamp that includes a parabolic or elliptical section below the major diameter as shown in Figure 1 (R) on page 5 of ANSI C78.79-2014 (R2020).

*R20 incandescent reflector lamp* means an R incandescent reflector lamp that has a face diameter of approximately 2.5 inches, as shown in Figure C78.21-254 on page 16 of ANSI C78.21-2011 (R2016) (incorporated by reference; see §430.3).

\* \* \* \* \*

*Rated wattage* means:

(1) \* \* \*

(iii) If the lamp is neither listed in one of the ANSI standards referenced in paragraph (1)(i) of this definition, nor a residential straight-shaped lamp, a represented value of electrical power for a basic model, determined according to 10 CFR 429.66 of this chapter, and derived from the measured initial input power of a lamp tested according to appendix R to subpart B of this part.

(2) With respect to general service incandescent lamps, a represented value of electrical power for a basic model, determined according to 10 CFR 429.27 of this chapter, and derived from the measured initial input power of a lamp tested according to appendix R to subpart B of this part.

(3) With respect to incandescent reflector lamps, a represented value of electrical power for a basic model, determined according to 10 CFR 429.38 of this chapter, and derived from the measured initial input power of a lamp tested according to appendix R to subpart B of this part.

\* \* \* \* \*

11. Amend § 430.3 by:

- a. Revising paragraphs (e)(3) and (4), and (7);
- b. Removing the words “IBR approved for §430.2”, and adding in their place “IBR approved for §430.2 and §430.32” in paragraph (e)(14);
- c. Removing paragraph (e)(17) and redesignating paragraphs (e)(18) through (e)(26) as follows:

Old paragraph	New paragraph
(e)(18)	(e)(17)
(e)(19)	(e)(18)
(e)(20)	(e)(19)
(e)(21)	(e)(20)
(e)(22)	(e)(21)
(e)(23)	(e)(22)
(e)(24)	(e)(23)
(e)(25)	(e)(24)
(e)(26)	(e)(25)

- d. Removing the words “appendix Q”, and adding in their place “appendices Q and R” in paragraphs (e)(6), (e)(11) and newly redesignated (e)(17);
- e. Revising Note 1 to Paragraph (e);
- f. Removing the words “appendices R and W”, and adding in their place “appendix W” in paragraph (l)(2);
- g. Adding new paragraph (l)(3);
- h. Removing the words “appendices R, V, and V1” and adding in their place “appendices V and V1” in paragraph (p)(2);
- i. Redesignating paragraphs (p)(4) through (20) as follows;

Old paragraph	New paragraph
(p)(4)	(p)(5)
(p)(5)	(p)(7)
(p)(7)	(p)(9)
(p)(9)	(p)(10)
(p)(10)	(p)(11)
(p)(11) through (15)	(p)(13) through (17)
(p)(16) through (20)	(p)(19 through (23))

- j. Adding new paragraph (p)(4);
- k. Revising newly redesignated paragraphs (p)(7), (9), (10);
- l. Adding new paragraph (p)(12);
- m. Revising newly redesignated paragraph (p)(13); and
- n. Adding new paragraph (p)(18).

The revisions and additions read as follows:

### **§430.3 Materials incorporated by reference.**

\* \* \* \* \*

(e) \* \* \*

(3) ANSI C78.21-2011 (R2016), (“ANSI C78.21-2011 (R2016)”), American National Standard for Electric Lamps - PAR and R Shapes, approved August 23, 2016; IBR approved for §430.2 to subpart B.

(4) ANSI C78.79-2014 (R2020), (“ANSI C78.79-2014 (R2020)”), American National Standard for Electric Lamps - Nomenclature for Envelope Shapes Intended for Use with Electric Lamps, approved January 17, 2020; IBR approved for §430.2.

\* \* \* \* \*

(7) ANSI C78.375A-2014 (R2020) Revision of ANSI C78.375-2014, (“ANSI C78.375A”) American National Standard for Electric Lamps-Fluorescent Lamps-Guide for Electrical Measures, approved January 17, 2020; IBR approved for appendix R to subpart B.

\* \* \* \* \*

NOTE 1 TO PARAGRAPH (e): The standards referenced in paragraphs (e)(6), (8), (11), (15), (16), (17), (18), and (20) of this section were all published by National Electrical Manufacturers Association (NEMA) and are also available from National Electrical Manufacturers Association, 1300 North 17th Street, Suite 900, Rosslyn, Virginia 22209, <https://www.nema.org/Standards/Pages/default.aspx>.

\* \* \* \* \*

(1) \* \* \*

(3) CIE 15:2018 (“CIE 15:2018”), Technical Report: Colorimetry, 4th edition, 2018, ISBN 978 3 902842 13 8; IBR approved for appendix R to subpart B.

\* \* \* \* \*

(p) \* \* \*

(4) IES LM-9-2020, (“IES LM-9-20”), ANSI/IES LM-9-2020—Approved Method: Electrical and Photometric Measurements of Fluorescent Lamps, approved February 7, 2020; IBR approved for appendix R to subpart B.

\* \* \* \* \*

(7) IES LM-20-2020, (“IES LM-20-20”), ANSI/IES LM-20-20 Approved Method: Photometry of Reflector Type Lamps, approved February 7, 2020; IBR approved for appendix R to subpart B.

\* \* \* \* \*

(9) IES LM-45-2020, (“IES LM-45-20”), ANSI/IES LM-45-20 Approved Method: Electrical and Photometric Measurement of General Service Incandescent Filament Lamps, approved February 7, 2020; IBR approved for appendix R to subpart B.

(10) IES LM-49-2020, (“IES LM-49-20”), ANSI/IES LM-49-20 Approved Method: Life Testing of Incandescent Filament Lamps, approved February 7, 2020; IBR approved for appendix R to subpart B.

\* \* \* \* \*

(12) IES LM-54-2020, (“IES LM-54-20”), ANSI/IES LM-54-20 Approved Method: IES Guide to Lamp Seasoning, approved February 7, 2020; IBR approved for appendix R to subpart B.

(13) IES LM-58-2020, (“IES LM-58-20”) ANSI/IES LM-58-20 Approved Method: Spectroradiometric Measurements Methods for Lighting Sources; approved February 7, 2020, IBR approved for appendix R to subpart B.

\* \* \* \* \*

(18) IES LM-78-2020, (“IES LM-78-20”) ANSI/IES LM-78-20 Approved Method: Total Luminous Flux Measurement of Lamps Using an Integrating Sphere Photometer,” approved February 7, 2020, IBR approved for appendix R to subpart B.

\* \* \* \* \*

12. Revise § 430.23 paragraph (r) to read as follows:

**§430.23 Test procedures for the measurement of energy and water consumption.**

\* \* \* \* \*

(r) *General service fluorescent lamps, general service incandescent lamps, and incandescent reflector lamps.* Measure initial lumen output, initial input power, initial lamp efficacy, color rendering index (CRI), correlated color temperature (CCT), and time to failure of GSFLs, IRLs, and GSILs, as applicable, in accordance with appendix R of this subpart.

\* \* \* \* \*

13. Appendix R to subpart B of part 430 is revised to read as follows:

**Appendix R to Subpart B of Part 430—Uniform Test Method for Measuring Electrical and Photometric Characteristics of General Service Fluorescent Lamps, Incandescent Reflector Lamps, and General Service Incandescent Lamps**

Note: After [DATE 30 DAYS AFTER DATE OF PUBLICATION OF THE FINAL RULE IN THE *FEDERAL REGISTER*] and prior to [DATE 180 DAYS AFTER DATE OF PUBLICATION OF THE FINAL RULE IN THE *FEDERAL REGISTER*] any representations with respect to energy use or efficiency of general service fluorescent lamps, incandescent reflector lamps, and general service incandescent lamps must be in accordance with the results of testing pursuant to this Appendix or the test procedures as they appeared in Appendix R to Subpart B or Part 430 revised as of January 1, 2021. On or after [DATE 180 DAYS AFTER DATE OF PUBLICATION OF THE FINAL RULE IN THE *FEDERAL REGISTER*], any representations, including certifications of compliance for lamps subject to any energy conservation standard, made with respect to the energy use or efficiency of general service



fluorescent lamps, incandescent reflector lamps, and general service incandescent lamps must be made in accordance with the results of testing pursuant to this appendix.

*1. Scope:* This appendix specifies the test methods required for determining the electrical and photometric performance characteristics of general service fluorescent lamps (GSFLs), incandescent reflector lamps (IRLs), and general service incandescent lamps (GSILs).

## *2. Definitions*

2.1 To the extent that definitions in the referenced IES and CIE standards do not conflict with the DOE definitions, the definitions specified in section 3.0 of IES LM-9-20 (incorporated by reference; see §430.3), section 3.0 of IES LM-20-20 (incorporated by reference; see §430.3), section 3.0 of IES LM-45-20 (incorporated by reference; see §430.3), section 3.0 of IES LM-58-20 (incorporated by reference; see §430.3), Appendix 1 of CIE 13.3, and CIE 15:2018 (incorporated by reference; see §430.3) apply in this Appendix.

2.2 *Initial input power* means the input power to the lamp, measured at the end of the lamp seasoning and stabilization.

2.3 *Initial lamp efficacy* means the lamp efficacy (as defined in §430.2), measured at the end of the lamp seasoning and stabilization.

2.4 *Initial lumen output* means the lumen output of the lamp, measured at the end of the lamp seasoning and stabilization.

2.5 *Time to failure* means the time elapsed between first use and the point at which the lamp ceases to produce measurable lumen output.

## *3. General Instructions*

3.1 When there is a conflict, the language of the test procedure in this appendix takes precedence over any materials incorporated by reference.

3.2 Maintain lamp operating orientation throughout seasoning and testing, including storage and handling between tests.

3.3 If a lamp breaks, becomes defective, fails to stabilize, exhibits abnormal behavior (such as swirling), or stops producing light prior to the end of the seasoning period, replace the lamp with a new unit. However, if a lamp exhibits one of the conditions listed in the previous sentence only after the seasoning period ends, include the lamp's measurements in the sample.

3.4 Operate GSILs and IRLs at the rated voltage for incandescent lamps as defined in 10 CFR 430.2.

#### *4. Test Method for Determining Initial Input Power, Initial Lumen Output, Initial Lamp Efficacy, CRI, and CCT*

##### *4.1 Test Conditions and Setup*

##### *4.1.1 General Service Fluorescent Lamps*

4.1.1.1 Establish ambient, physical, and electrical conditions in accordance with sections (and corresponding subsections) 4.0, 5.0, 6.1, 6.5, and 6.6 of IES LM-9-20.

4.1.1.2 Operate each lamp at the appropriate voltage and current conditions as described in ANSI C78.375A (incorporated by reference; see §430.3) and in either ANSI C78.81 (incorporated by reference; see §430.3) or ANSI C78.901 (incorporated by reference; see §430.3). Operate each lamp using the appropriate reference ballast at input voltage specified by the reference circuit as described in ANSI C82.3 (incorporated by reference; see §430.3). If, for a lamp, both low-frequency and high-frequency reference ballast settings are included in ANSI C78.81 or ANSI C78.901, operate the lamp using the low-frequency reference ballast. When testing with low-frequency reference ballast settings, include cathode power only if the circuit application of the lamp is specified as rapid start in ANSI C78.81 or ANSI C78.901. When testing with high-frequency reference ballast settings, do not include cathode power in the measurement. For any lamp not listed in ANSI C78.81 or ANSI C78.901, operate the lamp using the following reference ballast settings:

4.1.1.2.1 For 4-Foot medium bi-pin lamps, use the following reference ballast settings:

(a) T10 or T12 lamps: 236 volts, 0.43 amps, and 439 ohms, at low frequency (60 Hz) and with cathode power. Approximate cathode wattage (with 3.6 V on each cathode): 2.0 W. Cathode characteristics for low resistance (at 3.6V): 9.6 ohms (objective), 7.0 ohms (minimum). Cathode heat for rapid start: 3.6 V (nominal); 2.5 V min, 4.0 V max (limits during operation); 9.6 ohms +/- 0.1 ohm (dummy load resistor); 3.4 V min, 4.5 V max (voltage across dummy load).

(b) T8 lamps: 300 volts, 0.265 amps, and 910 ohms, at low frequency (60 Hz) and with cathode power. Approximate cathode wattage (with 3.6 V on each cathode): 1.7 W. Cathode characteristics for low resistance (at 3.6 V): 12.0 +/- 2.0 ohms; 4.75 +/- 0.50 (Rh/Rc ratio). Cathode heat for rapid start: 3.6 V (nominal); 2.5 V min; 4.4 V max (limits during operation); 11.0 ohms +/- 0.1 ohms (dummy load resistor); 3.4 V min, 4.5 V max (voltage across dummy load).

4.1.1.2.2 For 2-Foot U-shaped lamps, use the following reference ballast settings:

(a) T12 lamps: 236 volts, 0.430 amps, and 439 ohms, at low frequency (60 Hz) and with cathode power. Approximate cathode wattage (with 3.6 V on each cathode): 2.0 W. Cathode characteristics for low resistance (at 3.6V): 9.6 ohms (objective), 7.0 ohms (minimum). Cathode heat for rapid start: 3.6 V (nominal); 2.5 V min, 4.0 V max (limits during operation); 9.6 ohms +/- 0.1 ohm (dummy load resistor); 3.4 V min, 4.5 V max (voltage across dummy load).

(b) T8 lamps: 300 volts, 0.265 amps, and 910 ohms, at low frequency (60 Hz) and with cathode power. Approximate cathode wattage (with 3.6 V on each cathode): 1.7 W. Cathode characteristics for low resistance (at 3.6 V): 11.0 ohms (objective); 8.0 ohms (minimum). Cathode heat for rapid start: 3.6 V (nominal); 2.5 V min; 4.4 V max (limits during operation); 11.0 ohms +/- 0.1 ohms (dummy load resistor); 3.4 V min, 4.5 V max (voltage across dummy load).

4.1.1.2.3 For 8-foot slimline lamps, use the following reference ballast settings:

(a) *T12 lamps*: 625 volts, 0.425 amps, and 1280 ohms, at low frequency (60 Hz) and without cathode power.

(b) *T8 lamps*: 625 volts, 0.260 amps, and 1960 ohms, at low frequency (60 Hz) and without cathode power.

4.1.1.2.4 For 8-foot high output lamps, use the following reference ballast settings:

(a) *T12 lamps*: 400 volts, 0.800 amps, and 415 ohms, at low frequency (60 Hz) and with cathode power. Approximate cathode wattage (with 3.6 V on each cathode): 7.0 W. Cathode characteristics for low resistance (at 3.6 V): 3.2 ohms (objective); 2.5 ohms (minimum). Cathode heat requirements for rapid start: 3.6 V (nominal); 3.0 V min, 4.0 V max (limits during operation); 3.2 ohms +/- 0.05 ohm (dummy load resistor); 3.4 V min, 4.5 V max (voltage across dummy load).

(b) *T8 lamps*: 450 volts, 0.395 amps, and 595 ohms, at high frequency (25 kHz) and without cathode power.

4.1.1.2.5 For 4-foot miniature bipin standard output or high output lamps, use the following reference ballast settings:

(a) *Standard Output*: 329 volts, 0.170 amps, and 950 ohms, at high frequency (25 kHz) and without cathode power.

(b) *High Output*: 235 volts, 0.460 amps, and 255 ohms, at high frequency (25 kHz) and without cathode power in measurement.

4.1.2 *General Service Incandescent Lamps*: Establish ambient, physical, and electrical conditions in accordance with sections (and corresponding subsections) 4.0, 5.0, 6.1, 6.3 and 6.4 in IES LM-45-20.

4.1.3 *Incandescent Reflector Lamps*: Establish ambient, physical, and electrical conditions in accordance with sections (and corresponding subsections) 4.0 and 5.0 in IES LM-20-20.

#### 4.2. *Test Methods, Measurements, and Calculations*

Multiply all lumen measurements made with instruments calibrated to the devalued NIST lumen after January 1, 1996, by 1.011.

#### *4.2.1 General Service Fluorescent Lamps*

4.2.1.1 Season and stabilize lamps according to sections (and corresponding subsections) 6.1, 6.2, 6.3, and 6.4 of IES LM-9-20, including reference to IES LM-54-20.

4.2.1.2 Measure the initial input power (in watts).

4.2.1.3 Measure initial lumen output in accordance with section 7.0 (and corresponding subsections) of IES LM-9-20, including reference to IES LM-78-20.

4.2.1.4 Calculate initial lamp efficacy by dividing the measured initial lumen output by the measured initial input power.

4.2.1.5 Calculate CRI as specified in section 7.6 of IES LM-9-20 and CIE 13.3. Conduct the required spectroradiometric measurement and characterization in accordance with the methods set forth in IES LM-58-20.

4.2.1.6 Calculate CCT as specified in section 7.6 of IES LM-9-20 and CIE 15:2018 (incorporated by reference; see §430.3). Conduct the required spectroradiometric measurement and characterization in accordance with the methods set forth in IES LM-58-20.

#### *4.2.2 General Service Incandescent Lamps*

4.2.2.1 Season and stabilize lamps according to section (and corresponding subsections) 6.2 of IES LM-45-20, including reference to IES LM-54-20.

4.2.2.2 Measure the initial input power (in watts).

4.2.2.3 Measure initial lumen output in accordance with section (and corresponding subsections) 7.0 of IES LM-45-20, including reference to IES LM-78-20.

4.2.2.4 Calculate initial lamp efficacy by dividing the measured initial lumen output by the measured initial input power.

4.2.2.5 Calculate CRI as specified in section 7.4 of IES LM-45-20 and CIE 13.3. Conduct the required spectroradiometric measurement and characterization in accordance with the methods set forth in IES LM-58-20.

4.2.2.6 Calculate CCT as specified in section 7.4 of IES LM-45-20 and CIE 15:2018. The required spectroradiometric measurement and characterization shall be conducted in accordance with the methods set forth in IES LM-58-20.

#### *4.2.3 Incandescent Reflector Lamps*

4.2.3.1 Season and stabilize lamps in accordance with section (and corresponding subsections) 6.0 of IES LM-20-20 (incorporated by reference; see §430.3), including reference to IES LM-54-20.

4.2.3.2 Measure the initial input power (in watts).

4.2.3.3 Measure initial lumen output in accordance with sections (and corresponding subsections) 7.0 or 8.0 of IES LM-20-20, including reference to IES LM-78-20. When measuring in accordance with section 8.0, exclude undirected light using the method specified in section 8.2.

4.2.3.4 Calculate initial lamp efficacy by dividing the measured initial lumen output by the measured initial input power.

4.2.3.5 Calculate CRI as specified in CIE 13.3. Conduct the required spectroradiometric measurement and characterization in accordance with the methods set forth in IES LM-58-20.

4.2.3.6 Calculate CCT as specified in CIE 15:2018. Conduct the required spectroradiometric measurement and characterization in accordance with the methods set forth in IES LM-58-20.

#### *5. Test Method for Voluntary Representations for General Service Fluorescent Lamps*

Follow sections 1.0 through 4.0 of this appendix to make voluntary representations only for GSFLs that have high frequency reference ballast settings in ANSI C78.81-2016 and ANSI C78.901-2016 (incorporated by reference; see §430.3). Where ANSI C78.81 and ANSI C78.901 are referenced in the preceding sections, use ANSI C78.81-2016 and ANSI C78.901-2016 instead. Operate lamps using high frequency reference ballast settings and without cathode power. Voluntary representations must be in addition to, and not in place of, a representation in

accordance with sections 1.0 to 4.0 for GSFLs. As a best practice, an indication of high frequency operation should be provided with the voluntary representations.

*6. Test Method for Determining Time to Failure for General Service Incandescent Lamps and Incandescent Reflector Lamps*

*6.1 Test Conditions and Setup.* Establish ambient, physical, and electrical conditions as described in sections 4.0 and 5.0 of IES LM-49-20 (incorporated by reference; see §430.3).

*6.2 Test Methods, Measurements, and Calculations*

6.2.1 Season and stabilize lamps according to section 6.2 of IES LM-45-20 for GSILs and in accordance with section (and corresponding subsections) 6.0 of IES LM-20-20 for IRLs.

6.2.2 Measure the time to failure as specified in section 6.4 of IES LM-49-20 and based on the lamp's operating time, expressed in hours, not including any off time.

6.3 Accelerated lifetime testing is not allowed; disregard the second paragraph of section 6.4 of IES LM-49-20.

14. Amend § 430.32 by revising paragraphs (n) and (x) to read as follows:

**§430.32 Energy and water conservation standards and their compliance dates.**

\* \* \* \* \*

(n) *General service fluorescent lamps and incandescent reflector lamps.* (1) Each of the following general service fluorescent lamps manufactured after the effective dates specified in the table must meet or exceed the following CRI standards:

Lamp type	Nominal lamp watts*	Minimum CRI	Effective date
4-foot medium bipin	>35 W	69	Nov. 1, 1995.
	≤35 W	45	Nov. 1, 1995.
2-foot U-shaped	>35 W	69	Nov. 1, 1995.
	≤ 35 W	45	Nov. 1, 1995.

8-foot slimline	>65 W	69	May 1, 1994.
	≤65 W	45	May 1, 1994.
8-foot high output	>100 W	69	May 1, 1994.
	≤100 W	45	May 1, 1994.

\*Nominal lamp watts means the wattage at which a fluorescent lamp is designed to operate. 42 U.S.C. 6291(29)(H)

(2) The standards described in paragraph (n)(1) of this section do not apply to:

(i) Any 4-foot medium bipin lamp or 2-foot U-shaped lamp with a rated wattage less than 28 watts;

(ii) Any 8-foot high output lamp not defined in ANSI C78.81 (incorporated by reference; see §430.3) or related supplements, or not 0.800 nominal amperes; or

(iii) Any 8-foot slimline lamp not defined in ANSI C78.3 (incorporated by reference; see §430.3).

(3) Each of the following general service fluorescent lamps manufactured on or after January 26, 2018, shall meet or exceed the following lamp efficacy standards shown in the table:

Lamp type	Correlated color temperature	Minimum average lamp efficacy lm/W
4-foot medium bipin lamps (straight-shaped lamp with medium bipin base, nominal overall length of 48 inches, and rated wattage of 25 or more)	≤4,500K	92.4
	>4,500K and ≤7,000K	88.7
2-foot U-shaped lamps (U-shaped lamp with medium bipin base, nominal overall length between 22 and 25 inches, and rated wattage of 25 or more)	≤4,500K	85.0
	>4,500K and ≤7,000K	83.3
8-foot slimline lamps (instant start lamp with single pin base, nominal overall length of 96 inches, and rated wattage of 49 or more)	≤4,500K	97.0
	>4,500K and ≤7,000K	93.0
8-foot high output lamps (rapid start lamp with recessed double contact base, nominal overall length of 96 inches)	≤4,500K	92.0
	>4,500K and ≤7,000K	88.0
4-foot miniature bipin standard output lamps (straight-shaped lamp	≤4,500K	95.0



with miniature bipin base, nominal overall length between 45 and 48 inches, and rated wattage of 25 or more)	>4,500K and ≤7,000K	89.3
4-foot miniature bipin high output lamps (straight-shaped lamp with miniature bipin base, nominal overall length between 45 and 48 inches, and rated wattage of 44 or more)	≤4,500K	82.7
	>4,500K and ≤7,000K	76.9

Rated wattage is defined with respect to fluorescent lamps and general service fluorescent lamps in § 430.2.

(4) Each of the following incandescent reflector lamps manufactured after July 14, 2012, must meet or exceed the lamp efficacy standards shown in the table:

Rated wattage	Lamp spectrum	Lamp diameter inches	Rated voltage of lamp	Minimum average lamp efficacy lm/W
40-205	Standard Spectrum	>2.5	≥125 V	$6.8 * P^{0.27}$
			<125 V	$5.9 * P^{0.27}$
		≤2.5	≥125 V	$5.7 * P^{0.27}$
			<125 V	$5.0 * P^{0.27}$
40-205	Modified Spectrum	>2.5	≥125 V	$5.8 * P^{0.27}$
			<125 V	$5.0 * P^{0.27}$
		≤2.5	≥125 V	$4.9 * P^{0.27}$
			<125 V	$4.2 * P^{0.27}$

**Note 1:** P is equal to the rated wattage, in watts.

**Note 2:** Standard Spectrum means any incandescent reflector lamp that does not meet the definition of modified spectrum in §430.2.

(5) The standards specified in this section do not apply to the following types of incandescent reflector lamps:

- (i) Lamps rated at 50 watts or less that are ER30, BR30, BR40, or ER40 lamps;
- (ii) Lamps rated at 65 watts that are BR30, BR40, or ER40 lamps; or
- (iii) R20 incandescent reflector lamps rated 45 watts or less.

\* \* \* \*

(x) *General service incandescent lamps, intermediate base incandescent lamps and candelabra base incandescent lamps.*

(1) The energy conservation standards in this paragraph apply to general service incandescent lamps:

(i) Intended for a general service or general illumination application (whether incandescent or not);

(ii) Has a medium screw base or any other screw base not defined in ANSI C81.61 (incorporated by reference; see §430.3); and

(iii) Is capable of being operated at a voltage at least partially within the range of 110 to 130 volts.

(2) General service incandescent lamps manufactured after the effective dates specified in the tables below, except as described in paragraph (x)(3) of this section, shall have a color rendering index greater than or equal to 80 and shall have rated wattage no greater than and lifetime no less than the values shown in the table below:

**GENERAL SERVICE INCANDESCENT LAMPS**

Lumen ranges*	Maximum rated wattage	Minimum lifetime**	Effective date
1490-2600	72	1,000 hrs	1/1/2012
1050-1489	53	1,000 hrs	1/1/2013
750-1049	43	1,000 hrs	1/1/2014
310-749	29	1,000 hrs	1/1/2014

\*Use measured initial lumen output to determine the applicable lumen range.

\*\* Use lifetime determined in accordance with 10 CFR 429.27 to determine compliance with this standard.

(3) Modified spectrum general service incandescent lamps manufactured after the effective dates specified shall have a color rendering index greater than or equal to 75 and shall have a rated wattage no greater than and lifetime no less than the values shown in the table below:

**MODIFIED SPECTRUM GENERAL SERVICE INCANDESCENT LAMPS**

Lumen ranges*	Maximum rated wattage	Minimum lifetime**	Effective date
1118-1950	72	1,000 hrs	1/1/2012
788-1117	53	1,000 hrs	1/1/2013
563-787	43	1,000 hrs	1/1/2014
232-562	29	1,000 hrs	1/1/2014

\*Use measured initial lumen output to determine the applicable lumen range.

\*\* Use lifetime determined in accordance with 10 CFR 429.27 to determine compliance with this standard.

(4) Each candelabra base incandescent lamp shall not exceed 60 rated watts.

(5) Each intermediate base incandescent lamp shall not exceed 40 rated watts.

\* \* \* \* \*

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